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Vulnerabilities of Smartphones Payment Apps: The Relevance in Developing Countries

prof. Maurizio Cavallari
Università Cattolica del Sacro Cuore,
via Padre Agostino Gemelli, 1 – Milano (Italy)

dr Francesco Tornieri
Università Cattolica del Sacro Cuore,
via Padre Agostino Gemelli, 1 – Milano (Italy)

ABSTRACT:

Most major banks, credit card payment processors/issuers and large businesses have come to adopt mobile payment applications for smartphones. Africa, Asia, South America and other developing countries are no exceptions. The rate of growth of developing countries' smartphone market penetration and usage have increased tremendously in recent years. Based on previous research findings (Cavallari et al., 2015; 2016), the present study regards mobile payments as one of the new architectures at the heart of "social commerce". The paper discusses research into the technological aspects that pertain to security issues of smartphones. The novelty of present work resides in the authors' tailor-made approach. The empirical results highlight the extent of the information that can be passively accessed within the endpoint (smartphone) and the most vulnerable areas to consider. This study is especially pertaining to developing countries where smartphones models and versions of Operating Systems are particularly old or outdated. We conclude that the most critical risk carriers are linked to an abundance of devices with obsolete operating systems and that are no longer supported by the supplier. This has shown to be particularly true about Africa, Latin America and other developing countries, (Duncombe 2014; Han 2012; Asongu 2013). The research concludes that whilst the payment clearing companies are incapable of protecting endpoints, their development and deployment of payment solutions based on HCE architectures will increase the risk of criminal transactions. So the foreseen scenario will see fraud schemes that will migrate to the virtual payment environments found in the endpoint, instead of exploiting the weaknesses in the physical POS and/or credit card payment system. Practical research findings illustrate the most vulnerable areas of mOS in order to prevent attacks and tampering.

Key words: Developing Countries, Smartphones, Mobile Payments, Commerce, Endpoint Security

Introduction

Global data about the market penetration of mobile technologies and, in particular smartphones and data connections show that mobile industry continues to raise. From the 3.6 billion unique mobile subscribers at the end of 2014 figure, world's population is expected to scale up to add one more billion subscribers by 2020. This would take the global penetration rate to approximately 60%. In terms of global SIM connections, there were 7.1 billion at the end of 2014, and a further 243 million machine-to-machine (M2M) connections (cfr. The Mobile Economy 2015a).

Research studies from the last decade (Fuchs and Horak 2008; Molony 2008) stated that the least developed African countries, in terms of income, education and health, have very low Internet access and usage rates. The situation in 2008 seems to be eons away from that of today, even though some studies have already pointed out the positive effect of ICT on farmers, observing that mobile communications and information sharing are related to the quantity produced and the income level (Mwakaje 2010).

Today's data on internet usage (broadband) and smartphones shows a very different situation and suggests that key factors to overcome global digital divide in Africa (cfr. The Mobile Economy 2015a). Evidence from the last decade shows that the African growth rate is higher than for the rest of the world and not only in developing countries (Etzo and Collender 2010; The Mobile Economy 2015a, b, c, d).

The rate of growth of mobile connections and smartphone penetration and usage in developing countries have also increased tremendously in recent years (Osman et al. 2012; Phong and Solá 2015).

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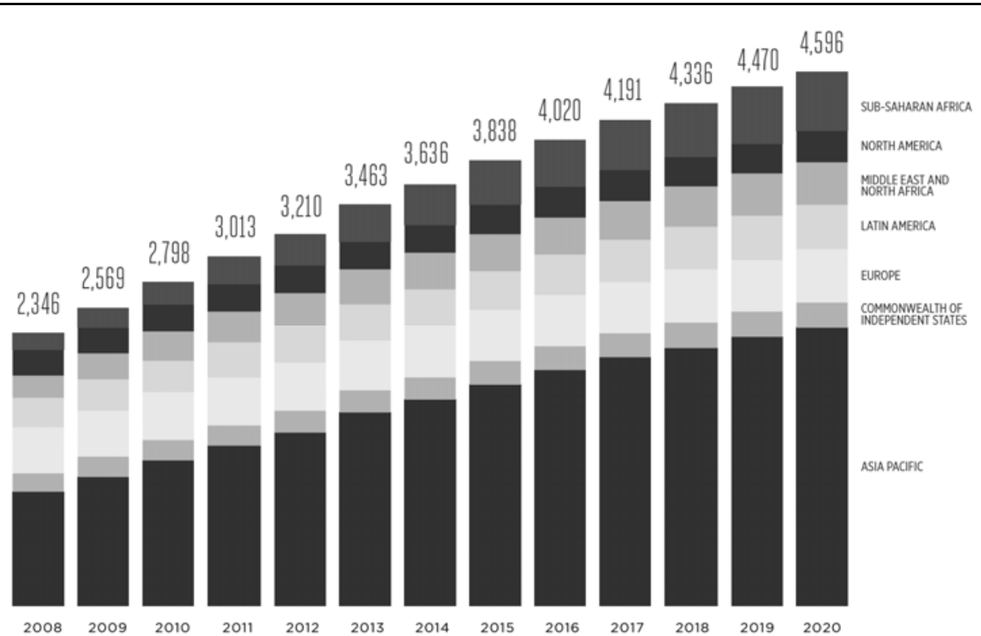
In the Asia-Pacific area alone, for example, from 1.3bn smartphones in 2014, is a growth of up until 3bn expected in 2020 (fig. 1), while broadband connections are envisaged to grow almost tenfold from 2014 to 2019 (fig. 2) as estimated by reliable source, such as GSMA Intelligence research (cfr. The Mobile Economy 2015b). The African Sub-Saharan region, as another example, in expected to raise smartphone usage from 160m in 2015 to 540m in 2020 (fig. 3), and broadband numbers show

Figure 1
World's Mobile Unique Subscribers (millions)
(source: The Mobile Economy 2015a)

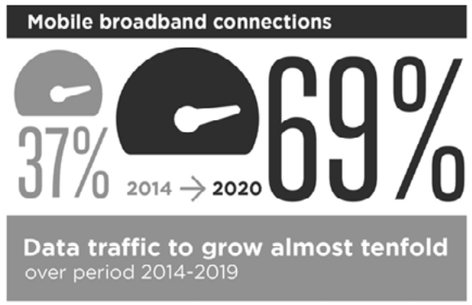


a provisional growth from 24% to 57% (fig. 4) (cfr. The Mobile Economy 2015c).

Moreover, the importance of mobile technologies had been investigated in terms of greater access possibilities to market information for farmers' communities (Njelekela and Sanga 2015; Adégbidi 2012; Magesa 2014).

The relevance of telecommunication infrastructures has been pointed out by some authors (Mawazo et al. 2015) in order to grant access to markets in rural areas of developing countries. Telecommunication means mobile communications and smartphones. Hence access to the agricultural market (information) requires infrastructure and funding, but more than anything, needs to ensure that rural areas are provided with mobile technology (Nyamba and Mlozi 2012).

Figure 2
Broadband Connections in Asia Pacific area
(source: The Mobile Economy 2015b)



The Problem

Most major banks, credit card payment processors/issuers and large businesses have come to adopt mobile payment applications for smartphones. The areas of Africa, Asia, South America and other developing countries are no exceptions (Hosman and Fife 2012; Samarajiva and Zainudeen 2011; Hosman 2010; Burrell 2010).

Figure 3
World's Mobile Connections
(source: The Mobile Economy 2015a)

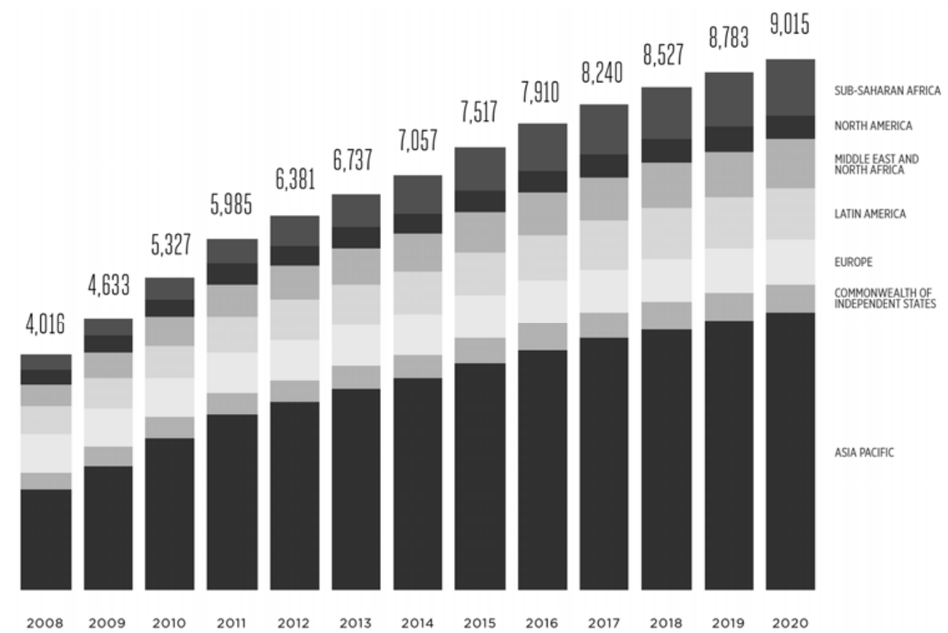
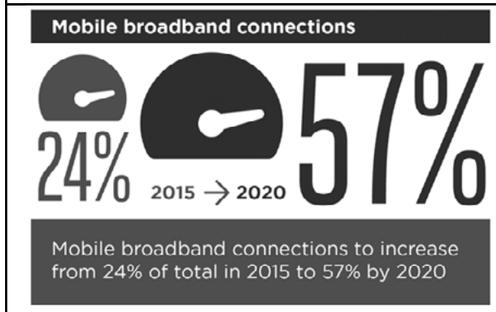


Figure 4
Broadband Connections in African Sub-Sahran area (source: The Mobile Economy 2015c)



Poor implementation of a solid online and social media platform strategy and tactics directly impacts upon a company's ability to market, sell and extend its brand reach globally, as in Mehrotra 2015; Singh 2008; Aker and Mbiti 2010). Business opportunities and new technologies like Web 2.0–in particular, smartphones with their newest hardware architectures and wireless capabilities–through to applications for mobile payments, enable new business models and the possibility of bridging the gap of digital divide in developing countries (Singh 2008, Porter et al. 2012). Those applications have come into play as a particular from of "social media" according to Gaytan and Arturo (2009), being that lots of customer personal information is channelled through mobile payment applications, Carmody (2012). For this reason, there has been an economic and organisational impact on users, as well as for businesses and financial institutions (see Brezoiu 2014). This is generally applicable to all markets and smartphone users.

The above is also true in developing countries (Aker 2010; Asche and Fleischer 2011). New opportunities for developing countries users–in particular in Africa (see Jidaw 2014), have occurred in terms of new channels, like Host Card Emulation (HCE) (Siegel 2013), allowing better payment solutions through improved security and minimizing frauds and monetary losses (Seclab 2014).

The present research paper particularly pertains to the particular impact of vulnerable smartphones in developing countries as the intensity usage of smartphones for payment is growing rapidly (Sanga and Buzingo 2013; Mawazo et al. 2015). This research aims at investigating possibilities of extracting information about mobile Operating Systems (mOS) from smartphones and consequent issues in mobile HCE (Host Card Emulation) applications. We argue here that security and information extraction through mobile profiling are intimately intertwined and play key roles in economic value (Sanga et al. 2014). They have had a direct impact on the social influence of information access and market behaviour in developing countries (Magesa 2014; Burrell 2010). At this point we should ask what level of security mobile and smartphone payment applications ought to be achieved as the result of the study of Goel and Goldstein (2014). In order to perceive the Risk/Opportunity of information extraction from social media (comprising mobile payment systems, which are a source of both basic and confidential information, as argued above), our research proposes an approach based on the technical issues concerning the vulnerability of and threats to smartphones, as well as user-side security aspects (Cavallari 2010) (see also, Sorrentino and De Marco 2013).

This research may cross the boundaries of some areas of computer science, but this is necessary in order to understand the problem as a whole, being that these technologies and architectures enable a new kind of commerce, referred to as social commerce. This commerce involves multiple disciplines, including marketing, sociology and psychology and computer science. Only by perceiving the baseline risk/opportunity of information extraction from social media, like payment systems on smartphones, can the discipline take into consideration further analysis and speculation about a possible enterprise approach to enterprise social interactions at both business and IT levels. Recent research highlights the current practices of social media analysis, whereby organizations access vast amounts of live data from social media (Sinha et al. 2012). Information extraction from smartphones should be considered an important aspect that could turn into a threat if not managed; thus, to be managed, extraction should be prior perceived. To perceive the latitude and longitude of information extraction from smartphones (i.e. endpoints in applications like payment ones), it is necessary to investigate the vulnerabilities and the practical possibilities to extract information from smartphones. This could be the first step in achieving a new mode of interaction at enterprise level, both with customers and with the socio-economic tissue of the society (as with Stephen and Toubia 2010). The business approach to social interaction is also fairly dependent on company culture (Cavallari 2005), thus revealing a strong necessity to interconnect mobile technology strategy, business model and information accessibility (Za et al. 2015).

Literature Review

The extraction of information from social media and from devices has not been thoroughly discussed in the community of Organisational Studies. Here, contributions of note include that of Krucher and Corritore (2004) supporting the statement that E-Commerce and brick and mortar business models share the same ethic, but that e-commerce issues have a different form and scope (see also Mohammad 2015). They demonstrate that ethical principles and rules in e-commerce and brick-and-mortar business are fundamentally the same, but have different manifestations at a fundamental level regarding the use of personal information. Other researches argue that when designing social commerce technology architecture, it is vital to prioritize their deployment through a bottom-up approach (Baghdadi 2013). He suggests that an incremental internal-to-external approach is particularly appropriate, as efficient use of SOA services, such as Software as a Service (SaaS), needs underlying layers of implementations to run correctly before a new layer may be built. Moreover, he states that social commerce cannot work if integration with suppliers, partners and service providers is not implemented properly. MacLennan and Van Belle (2014) suggest an architectural approach to designing and implementing IT solutions, which is also true for small and medium enterprises in Africa, as stated in Sanga and Buzingo (2013). The relationship between knowledge capture and value creation has proven true in a number of research studies (Ricciardi and De Marco 2012; Dameri et al. 2011).

Mobile applications are often also regarded as SaaS, much like the ones appropriate for social commerce (see Ferrari et al. 2011). Mutz (2009) starts from the observation that one of the most popular uses of the internet is for online purchasing, but some other statements integrate this view, as in Lee and Hutton (2015). The latter research has examined how online purchasing affects levels of social trust and found consistent evidence that positive e-commerce experiences promote generalized social trust. Any discussion about the implications of Mutz's findings for the role of business in helping to maintain attitudes supportive of democracy cannot be staged without taking into account enterprise social interaction and trust.

In regard to the sustainability of economic undertakings, Popescu (2015) provides strong evidence for the influence of ICT capital proportion on the production-oriented initiative of sustainable effectiveness, the sustainability inferences of e-business resolutions and e-commerce impacts on social sustainability (Massarat and Zehra 2014). Culture and social relationship styles also greatly influence information security (Bhattacharya 2011; Caralli 2004).

In the work of Stephen and Toubia (2010) we find that allowing online business to connect and generates considerable economic value, the network's value lies primarily in accessibility (also in Jones et al. 2013). The research findings of Asongu (2013, 2015) point directly to the issue of information extraction in order to generate this type of communication and give strong support for this research. Chin et al. (2009) show findings from empirical research demonstrating that trust in the Internet structure and susceptibility to social influence are significantly related to online purchase and payment. Regression analysis in their study provided insignificant influence between trust in the Internet structure and willingness to purchase online with social influence as a moderator.

Other research investigates the organization of technology adoption and combines the perspectives of the diffusion of innovations theory and the technology-organization-environment framework into one comprehensive model of technology adoption (MacLennan and Van Belle 2014). This study hence provides insights into the perceived risks and obstacles, but also the expected benefits. The findings include the importance of transformation towards and information extraction from social media in order to create value both for businesses and users, especially in developing countries (Aker 2010; Carmody 2012). It is thus very important at this point of the conceptual investigation to point straight to the technological aspects in order to comprehend the security aspects of mobile applications and user information as antecedents of further research.

The Need for a Technological Insight Into Smartphones

An in-depth view of the very basic technical functioning of mobile payment technologies is required to understand the real scope of the information gathering risk in a mobile payment process (Casalino et al. 2014; Alsboul 2010). The new contactless payment systems using Near Field Communication (NFC) and HCE technology base their functioning on mobile devices (smartphones and tablets) and pose a further and more problematic critical issue: the security of the endpoint, i.e. the smartphone (Cavallari et al. 2015). As both personal and business information is required to initiate and to conclude a mobile payment and information of the customer are found within the endpoint, it is of crucial importance to investigate the level of risk (as the counterpart of opportunity) for information to be extracted residing within that endpoint. Park and Shin (2014) demonstrate that tie strength, network density, network centrality and other factors will increase both (what they defined) "social networking service" (SNS)

and cognitive involvement in the online interaction (cfr. also Adégbidi 2012).

This research will focus on an empirical analysis of over 123,000 mobile devices conducted by means of state of the art technology custom built by the authors in order to fulfil the aims of the research project. The word "profiling" is used in literature in order to describe the systemic organization of information gathered and/or extracted so that a "profile" of the user/device/company could be outlined (Noorderhaver and Harzing 2009). The research does not investigate directly the endpoints in developing countries, but smartphones and mOS are longitudinal throughout the globe. For example, vulnerabilities found about Android vers. 3.3 in New Your City (USA) or Milano (Italy) would be exactly the same in Accra (Ghana), Kempala (Uganda) or Belmopan (Belize) (cfr. The Mobile Economy 2015a, b, c, d). In terms of concentrating only on mOS versions, and within those boundaries, our research is generalizable, both in the Western world as well as in developing countries.

The Research Questions

The following previous research findings indicate that an integrated approach to Technology/Information System/ Business/ can explain the adoption, continuation and extension of a technological innovation (Hossain 2013), while our research concentrates on radio frequency communications and transactions, i.e. Wi-Fi (Park and Shin 2014; (E&Y 2014). At this point, we are able to formulate the Research Questions (R.Q.) that will lead our empirical investigation:

R.Q. 1 What is the information that is possible to extract from endpoints (smartphones)?

R.Q. 2 What is the level of vulnerability of endpoints on HCE?

R.Q. 3 What are the major risk carriers?

R.Q. 4 Are Developing Countries at greater risk due to the general outdated version of smartphones' mOS?

The Environment of Investigation

The endpoint (user's smartphone) is the primary focus of the present study. The endpoint must be considered as everything that does not fall directly within the scope of the payment processing company and, therefore, not subject to the strict security policies that govern its payment devices (Tejbir and Saveeduz 2014). It is a common mistake to liken mobile devices to workstations or laptops, for the following reasons (cfr. ACCCS 2007; Fraud Guides 2014):

- The operating systems on mobile devices are immature as regards the implementation of security restrictions.
- Users are accustomed to using the phone as a useful tool to make calls but do not consider the protection of the smartphone with appropriate software (e.g. antivirus) necessary.
- The user is not aware that today's mobile devices have an operating system comparable to those in laptops/workstations.

The need has arisen for an objective index on the actual vulnerability of endpoint systems (smartphones) used by users to make payments and hence the idea of the present research. The present research uses Acorn RISC Machine (ARM) architecture, normally found in Android devices (ARM 2015), to enable both an easy software development environment (implementation of Linux operating systems for ARM environments has been used for many years) and greater portability of the device (by virtue of its smaller dimensions). The choice fell on hardware designed and sold by the company "Hardkernel", specifically on the "ODROID u3" card with the following features, also following (ISSA 2015):

- adequate computing power;
- 2 GB ram;
- 3 USB ports.

The aim of the study was to produce a tailor made tool for passive monitoring of 2.4 and 5 GHz (802.11 protocol) radio signals, i.e. WiFi.

On the basis of data available "in the wild" regarding the vulnerability of different mobile operating systems, a risk matrix of the endpoints monitored could be compiled. In no way did the passive analysis of the traffic generated by the endpoints enable the identification of the individual person.

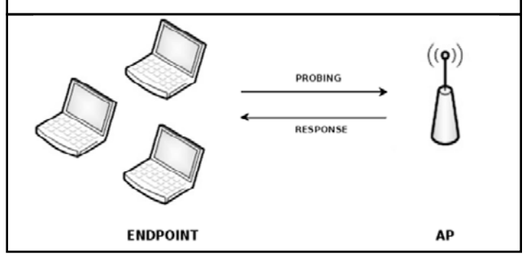
The Organization and the Technology

The device aims to analyse the 2.4Ghz/5GHz radio frequencies used by 802.11 protocol (IEEE 802.11), and normally used for Wi-Fi connections. The connection of an endpoint (any Wi-Fi device) to an Access Point (i.e. network device capable of transforming Wi-Fi connections into wired connections, or AP) has the following procedure (FBI 2014; CSI 2010):

1. PROBE, the endpoint (or STA, station) sends a signal (receivable by all devices in the area) to search for known APs (or those already connected to at least once). The AP will then respond to the probe signal (see Dyer 2014).
2. AUTHENTICATION, process in which the endpoint will send the credentials (shared passwords or, in corporate networks, username/password) to access the AP with the strongest Wi-Fi signal.
3. ASSOCIATION, process associating the endpoint to the AP (final phase, after which the device will be able to access the wired network where the AP is connected) (CR 2012).

The research project deals mainly with phase "1" (PROBE), responding to the broadcasting requests made by endpoints (see Figure 1), see also Clusit (2010) and Caceres and Teshigawara (2010).

Figure 5
Phase 1, probing.



The monitoring enabled the collection of data about the endpoints within range of the device tailored for the research project (dumb access point), including (ACC 2011; BOA 2012):

a. device model;
b. manufacturer;
c. version of operating system.

Information gathering

Monitoring took place over two weeks (from 01/12/2014 to 12/15/2014) and led to the identification of 123,475 single devices. The uniqueness of the device was given by the analysis of the MAC address, or unique serial number of the Wi-Fi card in the endpoint (e.g. 60:f8:1d:b5:28:66). The profile data made it possible to identify the category of the system (the first three fields of the MAC address identifies the manufacturer) used by the endpoints (e.g. iOS, Android). The following is an example of the data collected:

- MAC ADDRESS: 90:84:0d:84:32:c5
- MANUFACTURER: Apple
- HOSTNAME (device name): Cecile's iPhone
- OPERATING SYSTEM: iPhone 4 iOS 7.0.0

Figure 6
Access Point with NO-Connection

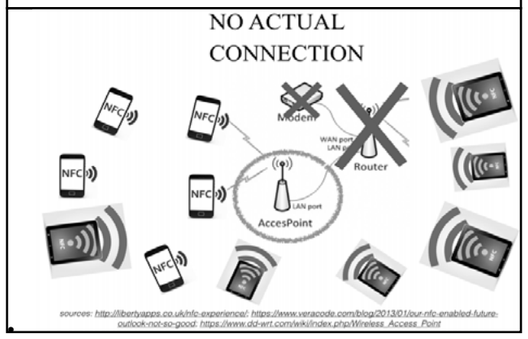


Table 1 below shows the breakdown by operating system of the sampled devices.

Table 1
Summary of collected data.

Operating System	% (Nn)
Android	72% (88.902)
iOS	18,2% (22.472)
RIM (BlackBerry	1,2% (1.482)
Windows Phone	8% (9.878)
Others	0,6% (741)

The version of the operating system was then analysed from the http header, normally generated by applications installed on the endpoint (Schwartz and Ungar 2015). Tables 2 and 3 show the version data for the Android and iOS devices.

Table 2
Android Versions

Android Version	%
2.2.x (FROYO)	0,5%
2.3.x (GINGERBREAD	8,5%
4.0.x (ICE CREAM SANDWICH)	6%
4.1.x-4.3.x (Jelly Bean)	51%
4.4.x (KitKat)	34%

Table 3
iOS Versions

iOS Version	%
iOS < 6.x	1,5%
7.x	24,5%
8.x	75%

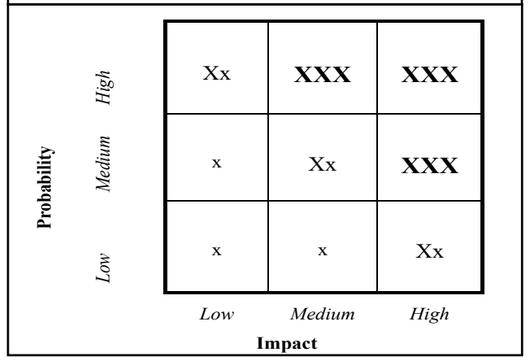
Information analysis

Once the version of operating system used had been identified, the analysis of the actual vulnerability was carried out according to the following procedure:

- Android operating systems. A virtual environment using the Google SDK (one system for each version detected) was created after which the "BlueBox Security Scanner" application was installed[1] (Specific software for vulnerability analysis available on the Play Store).
- iOS operating systems. Three different Apple devices (2 iPhones and 1 iPad) with versions 6.1.3, 7.1.2 and 8.1.3 (latest release) were used. The systems were later tampered with (operation called "jailbreak") and the vulnerability studied using the software "snoop-it[2]" available from the (unofficial) "Cydia" store.

Tables 7 and 8 below show the degree of risk assessed, considering the impact inherent in the attack vectors identified for the HCE payment platform. The degree of risk (low, medium and high) was established following the Open Source Security Testing Methodology Manual analysis of vulnerability (OSSTMM 2014):

Figure 7
Probability/Impact Matrix



RISK = PROBABILITY x IMPACT

Where:

- The "probability" is defined as the effective possibility that a vulnerability or threat is exploited.
- The impact is defined as the consequences resulting from the fact that the exploitation of vulnerability/ threat transpires.
- The "risk" is obtained as the product of the probability and the impact, in accordance with the following matrix.

Apple iOS devices implement NFC support only from version 8.x and only the latest generation devices (iPhone 6 and iPad 2 Air) carry the appropriate chip. However, it remains bound to the proprietary "apple pay" payment platform therefore the risks identified refer to a payment application based on HCE, but not utilizing NFC. The following table 4 shows the classification of Risk using applications based on HCE on Android system.

Table 4
Risk Using Applications Based on HCE on Android Systems

Risk	Classification	Android operating systems
Interaction with the cloud	Medium	2.2.x[1]
	Medium	2.3.x[2]
	Medium	4.0.x-4.3.x[3]
	Low	4.4.x[4]
Data saving on the device	High	2.2.x[5]
	High	2.3.x[6]
	High	4.0.x-4.3.x[7]
	Low	4.4.x[8]
Reuse of Tokens[9]	Low	2.2.x
	Low	2.3.x
	Low	4.0.x-4.3.x
	Low	4.4.x
Fake POS[10]	Not Available	2.2.x[11]
	Not Available	2.3.x[12]
	Medium	4.0.x-4.3.x
	Medium	4.4.x
Wallet vulnerability[13]	Not Available	2.2.x
	Not Available	2.3.x
	Medium	4.0.x-4.3.x
	Medium	4.4.x
Malware and fake apps[14]	High	2.2.x
	High	2.3.x
	Medium	4.0.x-4.3.x
	Medium	4.4.x
"Tap&Pay" vulnerability[15]	Not Available	2.2.x
	Not Available	2.3.x
	Not Available	4.0.x-4.3.x
	Low	4.4.x[16]

Table 5
Risk Using Applications Based on HCE on iOS Systems

Risk	Classification	iOS Operating System
Interaction with the cloud	High	6.1.3
	High	7.1.2
	Low	8.1.3
Data saving on the device	High	6.1.3[17]
	High	7.1.2[18]
	Low	8.1.3[19]
Reuse of Tokens[20]	Low	6.1.3
	Low	7.1.2
	Low	8.1.3
Fake POS[21]	Not Available	6.1.3
	Not Available	7.1.2
	Not Available	8.1.3
Wallet vulnerability	High	6.1.3[22]
	High	7.1.2[23]
	Low	8.1.3[24]
Malware and fake apps[25]	Low	6.1.3
	Low	7.1.2
	Low	8.1.3
"Tap&Pay" vulnerability[26]	Not Available	6.1.3
	Not Available	7.1.2
	Not Available	8.1.3

Conclusions

Information Gathering , Tables 1, 2 and 3 give full answer to R.Q. 1. Information Analysis (section 5.2), Tables 4 and 5 give full answer of R.Q. 2. Plus, the analysis of the data shown in tables 4 and 5 gives a full answer to R.Q. 3 and enables the identification of the major risk carriers (for the reference population). In addition, R.Q. 4 provides positive evidence that smartphones and mobile Operating Systems are longitudinal throughout the world. We can then infer and generalize the results and conclusions for developing countries, within the scope and boundaries of the present research which are illustrated herewith.

We can conclude that the most critical risk carriers (sector MEDIUM/HIGH of the risk matrix) are linked to an abundance of devices with obsolete operating systems and that are no longer supported by the supplier (Google or Apple). This was shown in Milano, but it is particularly true of Africa and other developing countries, (Duncombe 2014; Han 2012; Asongu 2013).

By comparing the analysis of the two O.S., it is possible to establish that Android systems are more at risk of attack because of:

- Inability to upgrade the operating system–unlike Apple-based solution, where there are different implementations of Android systems, often customized by the manufacturer of the device – e.g. Sony, Samsung- upgrades not only depend on Google (who is the developer of Android), but also on the individual manufacturer–e.g. Samsung, HTC etc.–that supply legacy implementations.
- Insufficiently stringent checks for malicious applications in the Play Store (to limit the problem, Google recently promised the introduction of new, more watchful controls).
- Possibility of installing applications manually without having to use an Official Store (e.g. downloading and installing the .apk file).
- Greater chance of tampering ("rooted") with the device to obtain "sysadmin", i.e. administrator privilege access.

It is believed that whilst the payment clearing companies are incapable of protecting endpoints, their development and deployment of payment solutions based on HCE architectures will increase the risk of criminal transactions. In currently exploiting the weaknesses in the physical POS and/or credit card payment system, fraud will migrate to the virtual payment environments increasingly found in the endpoint.

1https://play.google.com/store/apps/details?id=com.bluebox.labs.onerootscanner&hl=it

2https://code.google.com/p/snoop-it/

The answer of R.Q. 4 is positive as developing countries show a high percentage (Asongu 2015) of smartphones models incompatible with versions of Android mOS, higher than both 3.4 and 4.3, as well as a version of iOS higher than 6.1 and 7.0. This leaves space to infer that devices like those afore-mentioned cannot upgrade to higher and more secure versions (see Porter et al. 2015; Porter et al. 2012).

The results of the present research give space for deeper research into enterprise/customer relationship within the scenario of social and business interaction, along with a thorough investigation into other vulnerabilities and risk carriers on endpoints in developing countries (Njelekela and Sanga 2015; Chin et al. 2009). The results of the present paper are encouraged to investigate further the risks that are present in developing countries due to smartphone models and mOS versions in order to overcome vulnerabilities and interact with people in developing countries in a more secure fashion.

Acknowledgments

The present study springs out from diverse past research findings, in particular from the knowledge acquired with research studies presented to ICEIS–WOSIS Conference 2015 in Barcelona (SP) 26-29 April 2015 (Cavallari et al., 2015) and to ICTO Conference 2016 – Paris (F) 3-4 March 2016 (Cavallari et al., 2016).

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Footnotes

1 The 2.2.x family is no longer supported by the supplier (Google), and therefore subject to many critical vulnerabilities (eg FakeID–Detection BlueBox)

2 The 2.3.x family is no longer supported by the supplier (Google), and therefore subject to many critical vulnerabilities (eg FakeID–Detection BlueBox)

3 The range of families between 4.0.x 4.3.x is no longer supported by the supplier (Google) and therefore subject to some vulnerabilities (no high critical issues–Detection Bluebox)

4 System supported by the provider (Google) and analysis with Blue Box did not reveal any vulnerability

5 The 2.2.x family is no longer supported by the supplier (Google), and therefore subject to many critical vulnerabilities (e.g. FakeID–Detection BlueBox)

6 The 2.3.x family is no longer supported by the supplier (Google), and therefore subject to many critical vulnerabilities (e.g. FakeID–Detection BlueBox)

7 The range of families between 4.0.x 4.3.x is no longer supported by the supplier (Google) and therefore subject to some vulnerabilities (no high critical issues–Detection Bluebox)

8 Trust zones in place

9 Protection, cloud side, carried out by the supplier of the HCE solution.

10 It is independent from the platform since the attack vector makes a copy of the transaction by pretending to be the real POS.

11 NFC solution not available for Android 2.2.x systems.

12 NFC solution not available for Android 2.3.x systems.

13 Feature is only available for Android versions 4.x and later.

14 Google does not make sufficiently stringent checks to ensure that applications in the store do not include malware. Versions belonging to the 2.x family are more prone to this kind of vulnerability as they are dated and lack some of the safety features introduced only as of the 4.x family (e.g. TrustZone).

15 Feature is only available from Android version 4.4.x.

16 Currently, there are no specific vulnerabilities.

17 Open to jailbreaking, allowing full access to the area containing confidential information.

18 Open to jailbreaking, allowing full access to the area containing confidential information.

19 Jailbreak not available.

20 Protection, cloud side, carried out by the supplier of the HCE solution.

21 NFC chips currently only available for Apple Pay function.

22 Open to jailbreaking, allowing full access to the area containing confidential information.

23 Open to jailbreaking, allowing full access to the area containing confidential information.

24 Jailbreak not available.

25 Apple makes rigid and stringent checks on the applications that are published on Apple store.

26 Feature not available on iOS systems.

Educators' Challenge in Adapting to CPA Horizons 2025: A Road Map for the Future through Multidisciplinary Teams

Richard G. Cummings, Ph.D., C.P.A.
Professor, Department of Accounting
University of Wisconsin-Whitewater
Whitewater, Wisconsin

Peter J. Longo, Ph.D.
Professor, Department of Political Science
University of Nebraska at Kearney
Kearney, Nebraska

ABSTRACT

Over 75,000 comments from Certified Public Accountants (CPAs) were used to build a consensus in the year-long initiative that developed the CPA profession's plan for the next decade called CPA Horizons 2025: A Road Map for the Future. This paper will discuss two components of the plan relevant to University educators. First, how can educators provide a framework that will allow future CPAs to "stay more current with regulations and standards and social, economic, technological, and political trends domestically and abroad?" Second, how can educators provide a framework that will allow future CPAs to "build strategic alliances and work collaboratively to provide multidisciplinary solutions to complex problems?" This paper was prepared by a multidisciplinary faculty team from the accounting and political science departments from two different universities who used a class project to illustrate the value of multidisciplinary collaboration.

Real-life conditions transform academic exercises into problem-solving exercises; the methodological impact moves from disciplinary jargon to a simplicity associated with the actual resolution of complex problems.

Over 75,000 comments from Certified Public Accountants (CPAs) were used to build a consensus in the year-long initiative that developed the CPA profession's plan for the next decade called *CPA Horizons 2025: A Road Map for the Future*. This paper will discuss two components of the plan relevant to University educators. First, how can educators provide a framework that will allow future CPAs to "stay more current with regulations and standards and social, economic, technological, and political trends domestically and abroad?" Second, how can educators provide a framework that will allow future CPAs to "build strategic alliances and work collaboratively to provide multidisciplinary solutions to complex problems?" This paper was prepared by a multidisciplinary faculty team from the accounting and political science departments from two different universities.

The Road Map for the Future identifies Integration and Collaboration as one of the core competencies required of CPA members who wish to have a competitive advantage in the marketplace of the future. Specifically, it defines Integration and Collaboration as a tool where "CPAs are effective at building strategic alliances and working collaboratively to provide multidisciplinary solutions to complex problems." How do educators provide accounting students the opportunity to develop multidisciplinary solutions to complex problems?

Research on Multidisciplinary Teams

Current research provides an array of examples from different disciplines which have had success in implementing multidisciplinary teams presented below chronologically.

Healthcare is currently using multidisciplinary teams with success as indicated by Welch (2016) who describes the added value that multidisciplinary teams contribute in the community when delivering therapy for patients with chronic obstructive pulmonary disease (COPD). Drabsch (2015) found in a study that using a

senior multidisciplinary team known as the Sub-Acute Care Team "...was associated with greater adherence to clinical practice guidelines in the care of orthogeriatric inpatients in a rural health care setting." Lehman and Metzger (2016) report that "multidisciplinary team results showed in the patients' daily progress, outcomes and successful transition out of ICU."

Guengerich (2012) demonstrates collaboration between high-tech small businesses and New Mexico Tech students in technology management program and engineering program. Student and faculty teams provide engineering and marketing reports for the small businesses.

Papp and Matulich (2011) tell us millennials, born between 1979-1985, prefer collaborative projects and group tasks. Multidisciplinary teams allows them to be interactive with other students in an electronic environment. Millennials need time to digest the information they learn from projects, discussions, and allow time between classes or meetings to reflect.

Ewing and Baker (2009) provide an example of a Green Building Decision Support Tool. An undergraduate engineering economics class was assigned a collaborative group project to develop a tool that would be used in constructing a "green building". The engineering students met with stakeholders to use engineering economic models to develop alternatives for a green building.

Abendroth (2007) identifies medical and IT collaboration where an Academic Health Center combines medical staff with IT staff to bring about electronic medical records and computerized physician ordering diagnostic tests and medications and treatments (a 15 year goal). A dozen full-time nurses, pharmacists, lab professionals join with physicians (40% of their time) have brought about this change.

Multidisciplinary work can lead beyond the discussion of problems to solutions. As Buizer, et al (2015) aptly offered, transdisciplinary work can ultimately "achieve integration as a precondition for solving real-life problems." Academic endeavors that turn problem identifiers into problem solvers offer direction for productive citizens.

Methodology

An interdisciplinary faculty team from the accounting and political science departments from two different universities provided a project framework that will allow future CPAs to "build strategic alliances and work collaboratively to provide multidisciplinary solutions to complex problems." This project was designed as an extra credit project that would allow the students only to raise their grade if they chose to participate. Specifically, undergraduate students in a capstone political science upper-division class from one university were given the opportunity to collaborate with a graduate class in an entry-level graduate financial accounting class. Their goal was to collaborate to develop a Model Constitution and Business Plan that could be submitted to their respective student government about a Campus Response team for providing financial assistance to disaster areas. It was desired that this model be portable so that any student government could adopt it. Students had complete autonomy on how to organize their group to get the project done, including dropping students who did not do their work. The instructors anticipated that the business students would be more comfortable with doing the business plan and the political students would be more comfortable developing the Model Constitution that would be necessary to implement this plan in a university setting. These interdependent pieces would provide all students with an opportunity to collaborate. In addition students were asked to provide a reaction paper on what they learned from the content of the paper, what they learned from working with someone from a different discipline, and how they would improve the project.

Results

The Model Constitution and Business Plan submitted were both effective. The plans showed the students met and provided the structural components for both documents. Yet the reaction from students provided even deeper insights.

The accounting students had much to say about what they learned from the content of their projects. While the team was independent on how they developed their business plan, the following quotes from student reaction papers below provide a good overview of how they assessed this part of the project.

> "Throughout this project, I learned a lot about fundraising and setting up an organization. This was an amazing team to work with. Everyone worked brilliantly together, made decisions as a group, and performed to the best of their ability the tasks that were agreed upon at meetings. It was both a joy and a challenge sometimes to work as a group, but everyone handled it perfectly and overall it was a very rewarding experience."

> "Without a clear hierarchy in place we had to function as a democracy; this meant that every little decision took significantly longer." This comment was offered from both disciplines.

> "Furthermore, our group made a conscious effort to write the Business Plan (the Plan) in a way that even those who do not regularly work with numbers, money, or had any experience with accounting could follow the steps outline. I believe the options that are provided in the Plan are self-explanatory and do not require additional investment of time to understand what certain words mean."

In general there was a recognition that the silos of disciplines were real. Political science students approached the challenge from a big-picture ideal while the accounting focus was more detailed and linear. The cooperation and give-and-take was imbued by nearly all, even though there were perhaps occasional frustrations. Most students saw opportunities to working beyond a selected discipline. And, of course, all wished resources were available for a field trip to a distant campus.

Collaboration with many others over 800 miles away presented other opportunities.

> "There is obviously a very different approach to productivity among liberal arts students and business school students. Timelines are different, results are viewed differently, and communication is approached somewhat liberally. I think a side effect of this collaboration was that I learned to connect to something larger than just routine stuff. It made me be more curious and open to new ways of thinking. I did some reading on why people choose or are drawn to certain career paths and what drives their decision making. The discoveries helped me to be able to critically analyze situations, and also not to be apprehensive when I encounter an abstract. I have always been interested in theater and arts, as a consumer primarily. I did go to Art School for 5 years when a teen, but this project forced me to go further. It made me read, question, and think."

> "Working with different people in this project helped to get more close to my teammates and know them to a greater depth. It brought opportunities to realize everyone has unique skills and talents that when tapped on through collaboration and synergy leads to greater outcomes which exceed working individually. In a way, I felt this meets standard practice of collaborative work in the real world of business. Ones[sic] weaknesses could be easily compensated by others' strengths hence the environment is motivating for everyone to perform optimally, and meet stringent deadlines within the constraints of costs and other factors. Working with people from a different location and field of academia is an adventure as well as a test. It is an adventure because it brings skills and fresh perspectives on addressing problems. However, I have also felt sometimes without much clarity, there is a big challenge of people not being at par in grasping deliverables of the project. Each group had a different view on expectations and deliverables. Continued dialogue and exchange of information on progress at every milestone was an important ingredient as it reduced the possibility of misalignment of sections of the project."

Feedback on improvements for the projects focused on shared deadlines and better coordination of different university spring breaks and course expectations. There was additional feedback on the amount of time necessary to complete the project. It is interesting that there was not any feedback to change the different levels of disciplines of the collaboration groups.

Limitations of the Study

The author collaboration for this paper was modeled from previous research they have presented at conferences and have published. While each author clearly enjoys the benefit of looking at the world through a multidisciplinary lens for a broader and richer understanding of phenomena, there are limitations that accompany this multidisciplinary view. The decision to make the project an extra-credit assignment rather than a required assignment may have played some role in the level of participation students provided in the project.

At present, the study is limited to the courses that the authors teach, yet as this idea is expanded others may be able to broaden the number of courses and disciplines in future studies. The collaborators were able to execute this project without additional budgetary increases; there was no need for administrative approval of resources, except for the appropriate approval from the respective Institutional Review Boards (IRB).

Conclusions

As the American Institute of Certified Public Accountants, (AICPA)(2011), sets a road map for the future to the year 2025, a multidisciplinary project discussed above presents accounting students' comments which highlight the opportunity for students to stay more current with regulations and standards and social, economic, technological, and political trends domestically and abroad. At the same time the road map provides educators a project framework that will allow future CPAs to "build strategic

alliances and work collaboratively to provide multidisciplinary solutions to complex problems."

Given the long-standing work between the two collaborators, additional projects will likely continue. This work could be replicated throughout many colleges and universities. The authors suggest that the multidisciplinary approach be formally adopted by administration, faculty, and students. Efforts should be formalized, yet flexible enough to address the problem-solving feature of multidisciplinary work. One of the authors has recently been appointed as interim dean and has created an ad hoc committee on community outreach and service. The drive for this ad hoc committee was derived from the multidisciplinary insights gained from the projects. Work across disciplines and campuses needs to be formally supported, as it is truly a problem-solving activity. Problem-solving is essential for CPAs as well as for the greater citizenry.

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Applying Information Technology to Business Course Content: Perceptions of Faculty Learning and Development

Charles M. Coco
Associate Professor
Brimmer College of Business and Information Science
Tuskegee University
Tuskegee, Alabama

Faye Hall Jackson
Professor
Brimmer College of Business and Information Science
Tuskegee University
Tuskegee, Alabama

Cassandra Thomas
Assistant Professor
Brimmer College of Business and Information Science
Tuskegee University
Tuskegee, Alabama

Chia L. Chen
Assistant Professor
Brimmer College of Business and Information Science
Tuskegee University
Tuskegee, Alabama

ABSTRACT

The ongoing development of faculty remains a strategic objective for most colleges and universities. One area of development rapidly unfolding in importance is within information technology and assurance. The need for understanding and applying technological concepts within the classroom has grown due to increasingly high expectations among key stakeholders. For example, today's students expect course content to be digital, visual, and interactive. Employers, expect students to be prepared to use various types of technological tools and software. Colleges and universities expect faculty and staff to understand the use, application, and security of databases and systems-driven resources. Consequently, the overall pressure to learn and apply technological content in higher education has highlighted the critical need to develop faculty members in those critical content areas. This study examines the connection between knowledge and skills obtained within a business faculty workshop focused on information technology and developmental learning.

Introduction

The need for understanding and applying technological concepts within the classroom has grown due to increasingly high expectations among key stakeholders. For example, today's students expect course content to be digital, visual, and interactive. Employers, expect students to be prepared to use various types of technological tools and software. Colleges and universities expect faculty and staff to understand the use, application, and security of databases and systems-driven resources. However, due to large numbers of faculty members retiring by 2020, today's faculty will need ongoing support in similar areas as their forerunners (e.g., institutional orientation; teaching, research, and service activities; successfully making tenure; and developing positive relationships within the academic field). Current faculty will also need growing support in emerging areas as well: (1) keeping up with an increasingly technological workplace; (2) developing ways to further integrate technology into the instructional experience;

and (3) assessing student learning in a variety of instructional delivery modes (Diaz, Garrett, Kinley, & Moore, 2009). This study examines the connection between knowledge and skills obtained within a business faculty workshop focused on technological techniques and the six dimensions of *significant learning* (Fink, 2003).

Literature Review

Background

The traditional approach to student learning provided a hierarchical view of attaining foundational knowledge and course content (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). Approaches to the learning process have expanded to include emotional and non-hierarchical components that considered the importance of life-long learning (Robinson, 2009). According to Fink (2003), *significant learning* occurs only when students are enthusiastic and the class displays high energy levels. The result is a significant and lasting change in student learning.

Fink's Taxonomy

Fink's (2003) taxonomy of significant learning includes the following six categories which are used for integrated course design:

1. *Foundational knowledge contains the principles, concepts, and basic course information*. this knowledge provides the base for understanding other forms of learning.
2. *Application* involves applying knowledge by developing skills and engaging in critical, creative, and practical thought processes.
3. *Integration* consists of understanding the connections between ideas, people, and different aspects of interdisciplinary learning and life.
4. *Human dimension* contains learning that occurs when students gain new insights about themselves and others.
5. *Caring* involves the change and development of new feelings, interests, or values toward something that students now regard as more important.
6. *Learning how to learn* transpires when students embrace the process of learning and become increasingly effective in future learning efforts.

Fink's taxonomy of significant learning has shown positive results in the classroom (Fallahi, 2008; Fink, 2007; Levine et al., 2008; Miners & Nantz, 2009). For instance, one course redesign effort using means and t test comparisons validated Fink's taxonomy of significant learning as superior to the traditional lecture method in four of the six assessment areas (i.e., Foundational Knowledge, Application, Integration, and Human Dimension). Another example of course redesign using significant learning approaches led to establishing new learning goals, while dramatically improving student motivation and morale.

Information Technology

The amount of data businesses, government agencies, and organizations use is expanding. This is due to the amount and format of data being collected but also because previously collected data is being refined. In order to use this data wisely and make more informed and data-driven decisions, the modern professional and educator must be able to analyze this data and uncover patterns applicable to various concerns. Historically spreadsheet software and statistical software have been used to analyze and interpret data; however, it is constrained as a desktop application with limited accessibility, collaborative capabilities, security, and scalability. An alternative to spreadsheet and statistical software commonly used is data visualization software. This software allows users to visually decipher the data, while information can be more readily discerned and interpreted. Data visualization tools generate visual images which allow you to see patterns in large data sets quickly, easily, and in a universal format understood across various types of audiences. These images provide insight into complex data sets as well as encourage and stimulate discussion. The Data Visualization Workshop component provided faculty with an opportunity to learn and apply this process using the data visualization tool–Zoho Reports. Zoho Reports is an online tool designed for collaboration and multiple-users however users must first obtain an account. It is accessible from any Internet connected computer and has web-site publishing and sharing capabilities. Faculty members, using a sample data set, learned how to create a database from a CSV(comma separated values) and Excel file; create different types of charts and pivot tables; design a dashboard; share their chart, table, or dashboard for collaborative projects; and publish a dashboard on their web page or web blog.

Participant Responses

Faculty responses were generally positive regarding the workshop. The responses were categorized as follows: overall, cloud computing, and data visualization. The majority of the faculty respondents perceived that significant learning took place in each of the following areas with certain categories showing highly rated responses:

General Workshop

- The "Caring" dimension of learning was noticeably positive with a large majority of the faculty (78%) rating it as strongly agree (5 out of 5) on a 5 point scale.
- The workshop was very informative and timely. The presenters were all knowledgeable and passionate about their work. The programs introduced to us were a bit overwhelming and somewhat intimidating due to the short time allowed with the vast programs. I would like to use the software but some of the programs need re-introducing.
- I learning a great deal and am able to use some of it as a result of having participated in the workshop.
- The workshop provided a great opportunity to learn more about the importance of information technology in business today.
- On a very general level, the WORKSHOP was MOST INTERESTING..... and immediately USEFUL.
- This workshop was incredibly enjoyable with both the information presented and the interaction with the other participants. The overall learning experience was helpful, and I would love the opportunity to do more of these workshops.
- As a result of the workshop I realized I am not as tech savvy as I thought I was. Technology is constantly changing and as instructors we need to routinely update our skill sets as it relates to being able to use technology effectively both in the classroom and in our administrative duties.
- The experience provided an opportunity to discover the opportunities available in IT. It also provided me an opportunity to observe others and how others observe you.

Cloud Computing

- The "Foundational Knowledge" dimension of learning showed that over half of the responding faculty (56%) rated it as strongly agree (5 out of 5) and another (33%) agreed (4 out of 5) to learning something new about cloud computing.
- The cloud computing section of the workshop gave multiple opportunities to engage in significant forms of learning. For instance, the Google Drive and e-Portfolio activities reinforced learning by doing.
- Cloud computing is a great opportunity to share documents with faculty and students.
- I used Cloud Computing in one of my courses with mixed results. Some students worked well in the Cloud and found it easier for turning in assignments while others struggled with following directions of how to turn in the assignments.
- Cloud computing appears to be a beneficial tool especially when we work in several different areas, using various gadgets. I will need more instruction to use the cloud system effectively.

Data Visualization

- The "Foundational Knowledge" dimension of learning highlighted that a significant percentage of responding faculty (67%) rated it as strongly agree (5 out of 5) to learning basic concepts in data visualization more clearly.
- The data visualization section of the workshop gave multiple opportunities to engage in significant forms of learning. For instance, the Zoho Reports and dashboard activities reinforced learning by doing.
- I have not yet incorporated Data Visualization but will be in the future.
- The application used is so much easier than excel, but I had no clue it was available.

Summary

In general, faculty perceptions were positive regarding the significant learning aspects of information technology. Faculty provided interesting comments and generally appeared to rate learning associated with *foundational knowledge* and *caring* higher than other components. The faculty, in general, found benefit in learning new techniques such as cloud computing and data visualization. Future research is needed to further study the impact of information technology and significant learning outcomes for the faculty and their ongoing development.

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Analyzing the Needs of Rural Small Businesses and Developing Economic Sustainability Programs for Their Management Teams

Cooper Johnson
Lecturer of Management
College of Business and Global Affairs
The University of Tennessee at Martin
Martin, Tennessee

Sam Faught
Assistant Professor of Management
College of Business and Global Affairs
The University of Tennessee at Martin
Martin, Tennessee

Jamye Long
Assistant Professor of Management
College of Business and Global Affairs
The University of Tennessee at Martin
Martin, Tennessee

ABSTRACT

Small businesses in rural regions need programs to assist them in securing stable footing to best serve their communities and residents. By developing sustainability programs, the management teams of these organizations can utilize the knowledge gained from them in order to strengthen their positions and provide for the local economy. This research identifies programs which have proven to be successful in working with entrepreneurs and small businesses in six counties in the Lower Mississippi Delta in areas of financial management, education, workforce training, and development of future generations of entrepreneurs. Furthermore, this research proposes the application of similar programs in other rural communities seeking to enhance and strengthen their current local organizations.

Introduction

Rural regions share commonalities that define their economic, demographic, and operational characteristics. These provide challenges for the future of the regions and their residents. While difficult to overcome, measures taken to address these challenges can prove to be beneficial and yield positive results, thus strengthening these regions. One way to assist in this effort is to address the needs of the local businesses, which have a direct impact on the regions' economies, residents, and future growth.

An organization's sustainability is critical in the aspects of the business itself as well as the region in which it is located. Small businesses experience the impact of the local economy more quickly and significantly than larger organizations and, therefore sustainability becomes an issue of mutual success. Furthermore, rural regions depend heavily on the success of their locally-owned small businesses for economic growth and stability.

Rural Regions

Rural areas across the United States exhibit many of the same characteristics. With expansive land, rural regions often are home to agriculturally rich communities, whose economies and way of life are primarily dependent on the agriculturally-based businesses of farming and ranches. Infrastructure and advancements in technology are often lagging behind the most current available as priorities for these communities are in other areas of needs. Residents appreciate a simple lifestyle that consists of close, personal relationships within their communities that have been called home for generations. Rural areas experience financial challenges as the progress and positive changes that

are frequently experienced within urbans settings are not as plentiful. Opportunities for growth, expansion, and development in these areas are many times nonexistent, as large businesses are often uninterested and unwilling to invest in rural locations.

Mississippi: Overview of the Small Business Environment

Mississippi is primarily composed of rural communities and is a good representation of the type of non-urban setting primed for the opportunities described in this research. Through a review of the state's business environment it is better understood the economic conditions faced by residents, employers, and communities. According to the U.S. Small Business Administration Office of Advocacy (2013), "Small businesses significantly impact Mississippi's economy. They represent 96.5 percent of all employers and employ 49.5 percent of the private-sector labor force. Small businesses are crucial to the fiscal condition of the state and numbered 240,378 in 2010" (p. 1). Additionally, firms with 20-499 employees employed a majority of the 436,996 workers throughout the state. The term small, when referring to Mississippi's small businesses, is literal, as 81.1 percent of all businesses have no employees other than the owners and most employers employ less than 20 workers (U.S. Small Business Administration, 2013).

According to Business Dynamics Statistics of the U.S. Census Bureau (as cited in the U.S. Small Business Administration, 2015) the state's net new jobs created in 2012 was 6,418, most of which are attributed to the category of the small firm size of 1-4 employees. The significance of the state's small businesses is evident in its growing new business market. Mississippi is ranked in the top 5 states in the nation for entrepreneurial activity with 430 per 100,000 adults (Ewing Marion Kauffman Foundation, 2013, April).

The Lower Mississippi Delta

Through examining a region within the state of Mississippi that is heavily rural and encompasses the challenges faced by similar areas nationally, a more defined and clearer understanding of the situation at hand can be understood. A selected area of Mississippi to evaluate under these conditions is a portion of the Lower Mississippi Delta. According to geographers, the Lower Mississippi Delta is comprised of regions from seven states: Arkansas, Illinois, Kentucky, Louisiana, Missouri, Mississippi, and Tennessee (Latanich, 2001). While all of these states' designated Lower Mississippi Delta regions share similarities, those within the state of Mississippi are most prevalent in their characteristics appropriate for this study.

Mississippi's Lower Mississippi Delta is the region most viewed as economically depressed and exemplifies that of a rural region struggling to maintain a basic standard of living for its people. Like most rural regions, this area is perceived as a poor, low-class, uneducated, agriculturally-based society. In reality, as the poorest area in the entire Delta region, Mississippi has the lowest income and the lowest median household income for residents (Latanich, 2001). For the purposes of this study, the following Mississippi counties will be the scope of the research: Bolivar, Coahoma, Sunflower, Tallahatchie, Tunica, and Washington. Therefore, by understanding this region it is possible to generalize the lessons and knowledge gained to other similar regions.

Selected Demographic Data of the Selected Counties

The following data provides clear evidence of the challenges experienced by these counties. Overall, the population has decreased across the board, unemployment has risen, residents' education lacks advanced degrees, and the number of citizens living below the poverty line is significant. A substantial number of the residents in these counties are non-white and approximately half are women, thus these minority groups bear the brunt of the challenges associated with life in these conditions.

A majority of these counties have experienced continuing decreasing populations, a scenario not foreign to these areas (see Table 1).

The residents of these rural, Mississippi Delta counties experience hardships on average more than residents throughout the state of Mississippi and the nation. The percent of residents who are unemployed, living below the poverty level, over 25 years of age with a high school diploma, and minorities, specifically percent of woman and non-white residents, are depicted in Table 2. Also included are the data for the state and nation in these same categories.

Table 3 provides further support of the hardships faced by the residents of these counties. Each county's median household income is lower than that of both the state and the nation.

The Business Climate

As the data show, the residents and communities within these six counties in the Lower Mississippi Delta are faced with significant challenges. However, the hardships are not limited to their income, employment, education, race, and gender. These provide part of the story of the struggle for rural regions to survive, thrive, and meet the needs of their local communities.

Opportunities in the six studied counties of the Lower Mississippi Delta are further limited by the available employers in the areas. Like most rural regions, the counties struggle to attract profitable, large businesses, such as manufacturing plants, retail establishments, and service organizations. A vast majority of the employers are small, locally owned organizations that, while critical to the local economy, are limited in the number of residents they are able to employ. In order to have the desired effect on the local economy, the number of these smaller organizations must be significant, whereas, one large manufac-

Table 1
Population statistics by county
(Mississippi Department of Employment Security, 2012a)

County	2012 County Population	2010 County Population	2000 County Population	Population Changes from 2000 to 2012
Bolivar	33,904	34,145	40,633	Decreased 16.6%
Coahoma	25,709	26,151	30,622	Decreased 16.0%
Sunflower	28,431	29,450	34,369	Decreased 17.3%
Tallahatchie	15,111	15,378	14,903	Increased 1.4%
Tunica	10,475	10,778	9,227	Increased 13.5%
Washington	49,750	51,137	62,977	Decreased 21.0%
Total Population	163,380	167,039	192,731	Decreased 15.2%

Table 2
Selected statistics of specific Mississippi counties, Mississippi, and the United States

Location	Unemployment (February 2015)	Residents Below the Poverty Level (2012)	Residents 25+ Yrs. Old with H.S. Diploma (2012)	Population Women (2012)	Population Non-White (2012)
Bolivar	9.2%	34.3%	73.8%	53.5%	66.3%
Coahoma	12.8%	38.2%	76.6%	53.9%	76.6%
Sunflower	13.4%	36.1%	70.2%	46.8%	74.0%
Tallahatchie	9.0%	30.2%	65.7%	44.4%	58.7%
Tunica	13.0%	30.3%	76.8%	52.1%	77.1%
Washington	12.2%	37.3%	75.5%	52.9%	72.9%
Mississippi	6.8%	22.7%	81.5%	51.4%	40.2%
United States	5.8%	15.4%	86.0%	50.8%	22.3%

Table 3
Median Household Income
(by County, State, Nation)

County	Median Household Income (2012)
Bolivar	$28,599
Coahoma	$26,407
Sunflower	$26,619
Tallahatchie	$29,853
Tunica	$31,446
Washington	$28,093
Mississippi	$39,031
United States	$53,046

turing plant is able to provide a greater economic impact with relatively less effort.

Table 4 provides the number of organizations for the six county region. The area hosting the largest number of businesses is Washington County, which has over 400 more than the second ranked, Bolivar County. In fact, Washington County has more than twice as many businesses as third ranked, Coahoma County. The three remaining counties, Sunflower, Tallahatchie, and Tunica, combined have fewer businesses than Washington County alone.

Also presented in Table 4 are the numbers of employees for the six county area, which are divided into manufacturing and non-manufacturing firms. Not surprisingly, the greatest number of employees is found in Washington County, followed by Bolivar County, which are ranked first and second with regards to number of employers in the counties. The county with the third largest number of employees is Tunica County, which was the 5th out of 6th county in number of organizations. Following Tunica County is a near tie between fourth ranked Sunflower County with 9,760 employees and fifth ranked Coahoma County with 9,700 employees. The county with the least number of employees is Tallahatchie, which significantly trails the other counties by 6,300 less than Coahoma.

The number of employees of manufacturing organizations is frequently thought to be a significant number of the employed population, however as Table 4 shows that is not always the case. In the six county region identified, manufacturing firms make up 9.96% of the jobs held in Bolivar county, 6.60% of the jobs in Coahoma County, 3.48% of the employed in Sunflower County, 1.76% of the positions held in Tallahatchie County, 3.14% of the ones in Tunica County, and 6.54% of the jobs in Washington County. Overall, manufacturing provides less than 10% of the people in each county with employment. On the other hand, nonmanufacturing organizations employ over 90% of the positions in these counties.

Successful Programs in the Selected Counties of the Lower Mississippi Delta

The challenges faced within these regions allow for opportunities to build and develop programs aimed at meeting the specific needs of the local economy and residents. In an effort to provide for this six county rural region in the Lower Mississippi Delta, programs have been created addressing specialized areas of concern. Through improving the deficiencies one at a time, a ripple effect occurs, thus impacting the region resulting in far spread positive outcomes. For example, a training program put into effect that targets the local small business owners' needs to better manage their companies allows for more quality business practices in the area's organizations. An improvement to local business operations is felt throughout the community in a variety of ways, such as an increase in contributions to the local economy through residents' decisions to shop at their town's businesses. This results in a reduction in local unemployment rate as the need increases for a larger workforce to accommodate the increase in business.

Debt Education for Business Transformation and Sustainability (DEBTS)

The Debts Education for the Business Transformation and Sustainability (DEBTS) program provides debt management and credit repair services to 12-18 current and potential mico-entrepreneurs in Bolivar, Coahoma, Sunflower, Tallahatchie, Tunica, and Washington counties (Debt Education for Business Transformation and Sustainability Program, 2013; Business Thinking, n.d.). This program received funding from the United States Department of Agriculture Rural Development Rural Business Enterprise Grant and the Small Business Administration Prime Grant (Debt Education for Business Transformation and Sustainability Program, 2013). The DEBTS program is run through the College of Business at Delta State University.

Abe Hudson (personal communication, March 2, 2016), Program Director, shared that participants, referred to as clients, complete a curriculum of a training series which encompasses eight financial literacy modules, budget development, asset, liability, and equity emphasis, and cash flow management application. Additionally, DEBTS clients receive consultations bi-monthly with specialized experts to their financial needs. These consultants work with the business owners and entrepreneurs in addressing their financial challenges and better positioning them to obtain their organizational goals. DEBTS clients obtain marketing tools through the program, including graphic design and website support. The overall goal of the DEBTS program is to strengthen the clients' financial positions and allow them to create additional local jobs to impact the entrepreneurial ecosystem.

Furthermore, the DEBTS program offers public training programs, consultations, and resources through the DEBTS website in which additional business owners and entrepreneurs from the area are invited to participate. These "informal" clients amount to over 400 businesses receiving quality financial literacy education from the program (A. Hudson, personal communication, March

Table 4
Existing Industries, Number of Employees, and Types of Industries (2013 by County)

		Bolivar County	Coahoma County	Sunflower County	Tallahatchie County	Tunica County	Washington County
Number of Organizations		784	604	501	191	269	1,189
Number of Employees in Manufacturing Firms		1,400	640	340	60	360	1,280
Number of Employees in Nonmanufacturing Firms		12,660	9,060	9,420	3,340	11,100	18,290
Number of Employees in Nonmanufacturing Firms by Industry	Agriculture, Forestry, Fishing, Hunting	500	480	570	160	400	540
	Mining	0	0	0	0	0	20
	Utilities	30	50	20	10	10	30
	Construction	330	150	170	30	60	380
	Wholesale Trade	390	370	330	40	90	800
	Retail Trade	1,980	1,100	80	220	430	2,670
	Transportation & Warehousing	400	50	920	110	20	830
	Information	80	50	300	0	10	270
	Finance & Insurance	260	300	210	40	80	400
	Real Estate, Rental & Leasing	140	120	80	40	60	220
	Professional & Business Services	180	190	80	40	60	500
	Management of Companies & Entertainment	50	10	80	0	0	120
	Administrative Support & Waste Management	470	90	90	910	430	640
	Educational Services	120	70	120	20	50	180
	Healthcare & Social Assistance	1,880	1,600	720	140	230	1,950
	Arts, Entertainment, & Recreation	50	60	60	10	60	330
	Accommodations & Food Service	1,020	1,020	460	80	7,730	1,890
	Other Services (Except Public Administration)	200	160	220	120	30	730
	Government	2,740	2,010	3,750	990	940	4,350
	Education	1,840	1,180	1,160	380	410	1,440
	Total Number of Employees by County	14,060	9,700	9,760	3,400	11,460	19,570
	Total Number of Employees in 6 counties	67, 950					
	Total Number of Establishments in 6 counties	3,538					

2, 2016). Since the introduction of the DEBTS program, area business owners, entrepreneurs, and future start-ups have benefitted from additional opportunities sponsored and supported by the grant-funded program. For example, the program co-sponsored the Delta Entrepreneurship Network's The Delta Challenge 3-minute Pitch Competition in which local entrepreneurs introduced their business ideas to a panel of judges and a room full of sup-

porters. Additionally, DEBTS is supporting an effort to bring a Tallahatchie County Chamber of Commerce to fruition. And in Tunica County, the program provides technical assistance needed to introduce a business incubator to the area. Each of these supplementary efforts seeks to raise the quality of small businesses in the area as well as continue to encourage the local residents to pursue their entrepreneurial dreams (A. Hudson, personal communication, March 2, 2016). The economic impact of the DEBTS program is evident in the results. Throughout the first three years of the program, 70 jobs have been created and 125 positions have been saved. During this same time period the program accounts for 15 new businesses to the area (A. Hudson, personal communication, March 2, 2016).

Small Business Leadership Series

The Small Business Leadership Series is a partnership between the Washington County Economic Alliance (WCEA) and two business professors from Delta State University. The program offers monthly leadership and workforce development training to WCEA members, of which the focus is placed on small business owners, managers, and employees (C. Baker, personal communication, March 24, 2016). Examples of training topics include customer service, profitability, motivation, communication, conflict resolution, marketing, and teamwork.

The Small Business Leadership Series is a blend of education, networking, and a lunch break for participants. By partnering with the business professors, the WCEA brings in experts to help local business personnel grow their companies, manage their workforces, and better prepare for the future of their organizations (D. Wintory, personal communication, March 14, 2016). Additionally, this program creates a resource to assist in the overall recruitment and retention of small businesses and their workforces in the area.

Participants seek to build their organizations, address issues faced by their employees, and prepare for future expansion of their companies. Given the size of many of the participants' businesses, the costs of on-site training are not feasible, nor are specialized programs that require employee travel. However, the convenience and availability of this small, business-focused monthly training included in the cost of their WCEA membership is not only cost efficient, it also allows these critical players in the company's daily operations to receive needed information in the time they usually take for lunch.

FastTrac NewVenture

FastTrac NewVenture (NewVenture), a part of the Kauffman Foundation's FastTrac educational program, trains and prepares aspiring and new entrepreneurs in the beginning stages of their business ventures (Roush-Elliott, 2016). NewVenture is a thirty hour, ten module course that provides entrepreneurs with knowledge and skills needed to start a business, including learning how business models can match their visions and how to set realistic goals. Additionally, participants gain a better understanding of how to develop companies' brands and establish an organizational culture. The value of their businesses and the potential profitability is explored through an analysis of their goods and services. The participants are exposed to business functions, funding sources, and marketing tools throughout the program (Roush-Elliott, 2016).

The most recent cohort participating in the NewVenture program consisted of eleven entrepreneurs from the Lower Mississippi Delta (Roush-Elliott, 2016). Participants included a variety of individuals, from college students to working professionals, seeking to start their own businesses. Topic discussions were led by guest speakers, business instructors and local professionals, who provided expert knowledge on particular topics of interest. Additionally, through these community contacts, participants were able to strengthen their professional networks.

Master Teacher in Entrepreneurship

The Master Teacher of Entrepreneurship (MTEnt) program is a Mississippi certificate program for middle and high school teachers to educate them in the area of entrepreneurship, thus encouraging them to introduce the topic to their students through specifically designated courses or through integration into other business courses within their curricula (Jackson, 2012). The program trainings are offered as a collaboration between the Center for Economic and Entrepreneurship Education (CEEE) at the University of Southern Mississippi, the Mississippi Council on Economic Education, and the Mississippi Department of Education; the Department of Education confers the "Master Teacher of Entrepreneurship" designation (Jackson, 2012).

Participants of the MTEnt program complete five training modules: Fundamentals of Entrepreneurship; The Competitive Advantage; Marketing and the Business Plan; Business Finance; and Corporations and Management (Jackson, 2012). As part of the program, participants create a business plan and develop two lessons plans for classroom application. Following completion of the program modules, participants pass an assessment. The MTEnt program hosted in the Lower Mississippi Delta has graduated 22 participants in two years.

Summer Youth Entrepreneurship Program (SYEP)

The Summer Youth Entrepreneurship Program (SYEP), a partnership between Delta Health Alliance/ Indianola Promise Community and Delta State University's College of Business, provides participants from Sunflower County with exposure to information of the basics in starting and operating businesses. Program participates are African American males in 7th through 12th grades, who receive a certificate at the completion of the program (Johnson, 2015). Coursework is required of participants in the business areas of financial accounting, microcomputer applications, economics, customer service, sales, communications, legal considerations, marketing, and operations (Johnson, 2015). Additionally, they develop business plans and present their ideas to a panel of expert judges in order to receive quality feedback as well as exposure to business presentations. Guest speakers educate the participants in better understanding the business environment. Field trips to Delta State University and local businesses introduce students to their educational opportunities as well as possible career options as small business owners (Johnson). Local organizational owners and managers partner with the program, thus allowing SYEP participants to experience the firms with a new perspective through job shadowing.

The young men who participate in SYEP are provided valuable opportunities to learn from experts, experience first-hand daily business operations, and widen their understanding of entrepreneurship. For example, the job shadowing component of this program allows them to apply the knowledge from the courses to the job in which they are performing. Additionally, the business plans allow them to demonstrate their creativity, while researching the needs of the local community.

SYEP has introduced 31 participants to the potential opportunities available to them through entrepreneurship and will continue its efforts by inviting 38 new youth to participate in the next program cycle (Johnson, 2015). Graduates of the program have experienced positive outcomes as a result of their participation and anticipate future opportunities that will lead to success in business. For example, some program graduates received job offers from area businesses following their involvement in SYEP. Additionally, many participants expressed a desire to continue their education following high school graduation in order to learn more about their entrepreneurial career options (Johnson).

Discussion

The programs discussed, Debt Education for Business Transformation and Sustainability, Small Business Leadership Series, FastTrac NewVenture, Master Teacher in Entrepreneurship, and Summer Youth Entrepreneurship Program, were introduced with great success in six counties in one of the harshest, rural environments for new, small businesses: the Lower Mississippi Delta. This particular region struggles more so than other rural regions to support residents through attracting large economically prosperous firms and, therefore relies heavily on sustainable local small businesses. Through participation in the programs the areas' organizations have experienced positive outcomes, including sustainability within the region.

The programs address specific needs for rural businesses: financial literacy, credit repair, management and leadership training, new business start-up skills, education, and exposure to business operations. While these concepts are not new to rural small businesses, it also stands to reason they exist in areas beyond these six counties. As a result, these established and defined programs provide a substantial opportunity for many other rural communities. Using them as a starting point, it is possible to adapt and expand these ideas into ones that would better meet the specific needs of other areas' firms. By introducing similar programs featuring these concepts, small businesses in other rural areas can strengthen their potential for success and growth, thus improving the sustainability of their communities, which could enhance local economies and yield additional benefits for their regions.

Rural communities face unique challenges and through developing their communal strengths they have the potential to create a solid foundation not only for their current residents, but also for generations to come. By committing to establishing programs designed with the needs of the local small businesses in mind, rural areas can be better equipped to overcome some of the obstacles they encounter, such as economic instability, residential population decline, and unemployment. Investing in entrepreneurial establishments owned and operated by the residents within their own communities establishes a sense of value, worth, and dedication to the areas, as well as a feeling of pride and ownership in the success and accomplishments of the communities' businesses. The positivity this comradery brings to the areas can yield a stronger commitment to the communities, thus establishing sustainable local economies.

Conclusion

Given the success of the small business-focused programs in the Lower Mississippi Delta, it is reasonable to believe

similar ones will provide positive results in other rural areas. Through adopting, adapting, and hosting programs aimed at improving, growing, strengthening, and ensuring future successes and sustainability of areas' local businesses, communities can encourage investments in their local economies through the establishment of new businesses and continued support of existing firms. The sustainability of rural regions rests on the ability of the communities within these regions to produce a quality lifestyle for the residents and a nurturing environment for businesses. These characteristics allow for rural areas to maintain their unique cultures filled with distinguishable qualities and a desirable home for residents.

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Black Minds Matter: The Call to Retention of Young Black Academics (YBAs) in Higher Education

Erin Lynch-Alexander
Assistant Professor
Austin Peay State University

ABSTRACT

Academics like Dr. Melina Abdullah have helped give birth to the Black Lives Matter movement; however, in higher education the slogan transforms into a slightly different context, and should become the movement of "Black minds matter." For nearly 50 years, Institutions of Higher Education (IHEs) have sought to increase their compositional diversity, in efforts to create environments where their student population can look reflectively upon faces similar to their own. Universities have sought to implement principles of Critical Mass theory to diversify the student compositional demographics, in addition to significant retention and recruitment initiatives geared toward faculty (Whitaker, Montgomery, & Martinez-Acosta, 2015). Despite such initiatives, the overall attrition rate for Underrepresented Minority faculty is 48%, with rates of 27%, 36%, 42%, and 90% for Asian, Hispanic, Native American and Black faculty respectively. The use of the COPE © Model in IHEs could potentially provide outlets of empowerment for URM that would increase retention.

As we embark upon the beginning of another academic year, we find ourselves facing familiar issues that have plagued us in academe for well over forty years: a shortage of minority faculty. For the first time in decades our K-12 classrooms reflect more diversity than previous years, but the classrooms in Higher Education struggle to mirror those faces matriculating to the collegiate setting. Institutions of Higher Education (IHEs) have sought to increase their compositional diversity for nearly 50 years, in efforts to create environments where their student population can look reflectively upon faces similar to their own, standing behind lecture podiums or in lab coats. While the studies, programs, and initiatives have been heavily focused on student retention, limited programs have been extensively focused on faculty retention. Despite some of the most frequently cited factors to minority student retention, interactions with and mentorship from faculty of similar cultural backgrounds, IHEs collectively continue to address student retention as an issue distinctly separate from minority faculty retention.

The Revolving Door of Academe

With varying level of degree, IHEs attempt to give voice to underrepresented minorities in student and faculty ranks by spending millions on diversity consultants each academic year to capture the cultural climates of their campus. Yet, Shaun Harper expresses, "faculty and staff members of color will keep leaving through a revolving door…[without] authentically enacting diversity-related commitments espoused in mission statements" (para. 13). Harper's editorial speaks to the revolving door for all faculty and staff of color, but it is Black faculty who experience the greatest attrition rates in Higher Education, particularly the faculty of Generation X and Millennial populations who fail to persist much like our sparse Black Baby Boomer faculty.

Although GenX and Millennials represent a full 30% of the current workforce, we represent much less than that in academe (Tulgan, 1995). We are Zora Neale Hurston's 21st Century mules of the world, recognizing we are the future of academe, yet feeling as though our early career, and non-tenured voices are not shaping the current conversation in promoting diversity and inclusivity across our campuses as much as we would like. Data for the shortages in Generation X and Millennial Black faculty is nearly impossible to find in national data sources. But according to general data from NCES (2005, 2013), 6 percent of the total assistant professors in fall 2003 were Black, by the time this cohort would have obtained full professor rank (generally 7 years later), they represented 4 percent of faculty with full professor rank. In the grand picture, the same fall 2003 cohort of assistant professors represented 1.5 percent of the total Professoriate, but by fall of 2011, Black full professors represented .09 percent of the total Professoriate. Theoretically, the attrition rate for Black faculty from early career (assistant professor) to

tenure status (full professor) is 94 percent. In more practical terms for every 10 early career Black faculty joining academe, 9 of us will not make it to full professor.

In 1985, just as the first of the millennial generation were entering grade school, Harvey and Scott-Jones called the Black Professorate "elusive" and in 1992 Tack and Patitu claimed we were in "peril." As contemporary numbers demonstrate we are still elusive. Most recent 2014 NCES data reports 2.4% of the total professoriate from Fall 2013 is Black, with Assistants comprising of 1.3%, Associates, 1.1%, and Full Professors, .08% of the total Professoriate. The perilousness of the attrition is what damages the University's ability to retain students of color. Without genuinely innovative interventions from our universities, then many of us face the decisions to transition to private sector consulting work or administrative positions, leaving our beloved students of color without racially and ethnically corresponding role models in the classroom. One of the first manners in which IHEs can mitigate the standard attrition rate of Black faculty is through developing explicit initiatives that speak to who young Black academics (YBAs) are as a generational population.

Who Are GenX and Millennials?

Knowing who we are as a generation will not only help IHEs to develop more innovative programs to retain us, but will also increase our capacity to produce for our Universities. GenXers are defined as individuals born approximately between 1965-1980 and Millennials are frequently identified within the bracket of 1981-2000 (West Midland Family Center, 2015; Reisenwitz & Iyer, 2009). Our life experiences, historical incidents, and traits from parenting styles have shaped our generational culture and are exhibited in our core values and attributes.

It is these commingled traits and values that differentiate GenX and Millennial faculty from preceding Baby Boomers (1946-1964) and Traditionalist (1926-1945), but also they are what make us more difficult to retain. Independent minds of GenX faculty, who value entrepreneurialism and results, align with our fierce skepticism of "the establishment," yet, ironically it's that very skepticism that draws many of us to higher education. We see higher education as the avenue by which we can demonstrate our intellectualism, our autonomy, and our commitment to globalism and humanistic advocacy. For Millennials, who hold more degrees on average than previous generation and are statistically more available to meet the credential requirements for faculty positions at IHEs, their competitively ambitious drive coupled with the desire to serve as change agents makes them ideal candidates for universities focused on Community Engagement or innovative research. A reported 70% of Millennials participate in community service and philanthropic efforts as part of their daily lives (Gordon, 2007), and their generational commitment to being innovative produces market disrupting products, processes, and technologies that many IHEs are losing to the private sectors. Acknowledging and understanding the deeply engrained traits of GenXers and Millennials as to why we enter Higher Education, is also the key to keeping us in higher education. On a survey dispersed nationally amongst Black GenX and Millennial faculty the responses support the impact of our generational core values and attributes as to who we are as higher education professionals.

When answering why we chose to enter higher education, respondents answered with reflective honesty, and a pragmatic optimism both representative of our generational values and attributes. A GenXer male faculty, formerly at a predominately White university indicated, he "wanted to complement [his] activism with intellectual knowledge and credentials." Another Black GenX faculty member at a Research Institution articulated, "I was really interested in black student retention and higher education access. I feel like I can make the most contribution here…" while another stated, higher education became a venue by which he could "advocate for the communities with which I work." A Black GenX faculty at a community college simply stated, "I love learning!" The humanistic advocacy laced with intellectualism found in GenXers is evident in how we are drawn to careers in higher education.

While GenX faculty commitment to serving as advocates through use of pragmatic intellectualism is evidenced in our reasons for entering higher education as faculty, there is also the role of our affinity toward autonomy. As one GenX associate professor at an urban research institute shared, "I liked the flexibility of my schedule" and as another GenX assistant professor, research faculty member at a research institution commented, "academia became the sparkling, stellar way to have a flexible enough schedule to be there for my children." This powerfully attractive element of freedom and flexibility speaks to the GenXer's attributes of autonomy, independence, and flexibility. In a statement from an associate professor at a rural doctoral university, the combined value of flexibility and advocacy are apparent in his rationale for entering higher education, "I treasure the flexibility and ability to do what I want as well as impact young people."

Serving as faculty in Higher Education provides an almost enigmatic magnetism as a career fields for many of us, thus not requiring IHEs to exert a great deal of effort to recruit the GenXers faculty. Although, those very same generational traits when not cultivated, celebrated, or acknowledged by the University drive us to other organizations like private and corporate sectors, or other sects of higher education like administration. Without intentional and innovative programs to retain Black faculty, programs designed to speak to our generational traits and values, then University classrooms will become devoid of the racial and ethnic cultural diversity that for many students is the first step to making meaningful connections to the University.

Table 1
Core Values and Attributes of GenXers and Millennials
(Excerpt from West Midland Family Center, 2015)

	Generation X (1965-1980)	Millennial (1981-2000)
Core Values	Cynical	Achievement
	Diversity	Civic Duty
	Entrepreneurial	Confidence
	Fun	Competitiveness
	Global Thinking	Diversity
	High job expectations	Morality
	Independent	Sociability
	Pragmatism	Optimism
		Spirituality
Attributes	Adaptable	Ambitious but with less focus
	Autonomous	Change agents
	Confident	Fast paced
	Competent	Group Oriented
	Ethical	Highly Educated
	Flexible	Innovative
	Goal Oriented	Multiculturally focused
	High Work Ethic	Patriotic
	Intellectual	Respectful toward competence not titles
	Loyal to Leadership	Sense of Entitlement
	Pragmatic	Structured
	Results driven/focused	Team players
	Self-Starters	Technologically savvy
	Sense of Entitlement	Tenacious
	Workaholic	Want to please others

Innovative Interventions

While the most basic implementation of mentorship programs has been the traditional method by which University's seek to enculturate and retain early career faculty in general, there must be a much more intensive and conscientious attempt by University's to develop strategic programs for retention for the GenX and Millennial Black faculty. This is not to say that mentorship is not a vital component for retention practices, this is to say that mentorship is not enough. 78 percent of the GenX faculty participants in the survey regarding Higher Education

Experiences, reported there was little to no mentoring for them as they entered employment in academe. The glaring absence of formalized mentorship provides just a glimpse into the on-boarding experience of Black faculty. One Black former faculty member, turned senior level administrator at a research institution, articulated,

> I found that new faculty members receive very little mentoring in terms of professional development. Of course, I could say the same thing about being an administrator. Higher Education is definitely a "trial by fire" type of environment, without any clearly defined sense of mentoring. I have found in my experiences within higher education that the mentoring comes just as much in the form of what is not being said as what is said.

A GenX , full professor respondent expressed, "I got next to Ø mentoring to move from associate to full. And then--bitter humor--the committee review came back asking why I hadn't gone up earlier!!!" This Black faculty member's achievement to persist, when nearly 94% of others do not, is an accomplishment in itself, yet in their response there exists deeper story that may be the experience of multiple Black faculty who are without effective mentors. Where there are universities with policies outlining mandatory promotion, retention, and tenure calendars, there are faculty who ineptly navigate that path to tenure without mentorship, and potentially fail to persist. Another GenX, associate professor commented, "Faculty of color don't need traditional mentoring so much as they need to be told who to just avoid like the plague. At my old institution, I got no mentoring whatsoever from colleagues: literally none. All I knew about the tenure process came from a group of Black faculty who got junior faculty together on the regular for discussion… You don't need a mentor so much as a godfather." Such is the frequent role of many Baby Boomer Black faculty who participate in the culturally defined term of "pouring in" to their early career black faculty. Yet, this element is an unexplored component of retention of Black faculty. The act of "pouring in" more loosely aligns with the concept of shared tacit knowledge. While findings from research on the implementation and impact of mentorship imply its presence, little direct exploration of it is found in the literature, despite the strong belief in the importance of mentors in providing tacit knowledge or cultural adaptation mechanisms for the IHE culture. In examining the impact of mentorship programs for underrepresented minority (URM) faculty at predominately White institutions (PWIs), Zambrana, Ray, Espino, Castro, Cohen, and Eliason, (2015) give voice to those who benefited from mentors. They provide evidential commentary that clearly defines how URM faculty mentors have "poured in," validating to the mentees that their *minds* do matter, but there still lacks a defined model for providing innovative retention practices beyond mere mentorship.

A problem is that a number of organizations, to include Universities, have the concepts of strategy and innovative misconstrued. Mentorship programs in themselves are no more innovative than online learning now. But since strategic is often mistakenly responsive, and innovation is usurped by an internalized system of the Ptolemaic mentality, there is difficulty in creating programs that are explicit to the specific identity of a University. When both, strategic planning and innovation, are used as the conceptual framing for program planning for retention, then there becomes an inherently progressive component that is unequivocally tailored to the University.

C.O.P.E © Model for Retention

Innovation and being strategic are coupled in the C.O.P.E © model for retention. This model which can be applied to varying institutions, from small rural liberal arts schools to large research one institutions, is a skeletal model with pillar components that will look different at each University. As evidenced in the literature, each component in itself is a powerful element to organizational success, but when blended strategically the layered effect will potentially amplify its intentional use to retain all early career faculty, but particularly GenX and Millennial Black faculty.

Communities

Community building is the first pillar to the C.O.P.E© model. Universities are inherently communal environments, with departments within colleges within the University structure as a whole. Institutions where shared governance is practiced indelibly promotes community building, but will frequently restrict junior faculty from such opportunities to serve. To build authentic communities that keep the GenX and Millennial faculty engaged, there should be a basis of likes. The socio-emotional bonding that occurs when individuals with common interests and passions are collectively grouped is the method by which IHEs should implement the first pillar in the C.O.P.E © model. Brown (2001) articulates three stages to community building, first establishing social relationships; secondly, community conferment or being accepted; and third, camaraderie through long-term interactions. There is no designated degree of time by which these three stages should occur; they may occur in consecutive or concurrent stages, but all three must occur to establish a community. For administrators and educational leaders this means providing processes that purposefully provide

a community for GenX and Millennial faculty, which may be done through applied use of human capital or interest surveying to make communities on campus that are rooted in those very same socio-emotional components that drive our research agendas and philanthropic/community engagement passions. The result of building authentic communities is increased opportunities for interaction, which must also be a purposeful action on the part of IHEs for retention.

Opportunities for Interaction

GenX and Millennial faculty need to interact. Both exhibit generational traits with an affinity for socialization, Millennials more so than GenXers. Millennials are more apt to establish workplace social-friendships than GenXers, therefore tapping into this element by providing opportunities for interactions is critical. After having established communities, IHEs need to provide structure and semi-structured opportunities for interaction. This can take the form of monthly open forum meetings with cohorts of new faculty, or semi-structured meeting time for the communities that were previously established. For this to work, there will need to be support from both upper and mid-level administrators like Department Chairs and Deans who may coordinate course schedules for new faculty, so as not to schedule courses during the times set by senior administrators for the opportunities for interactions. One of the more frequently reported reasons for reconsidering higher education faculty for Black GenX faculty was "lack of support." A respondent simply stated, "leadership that is impartial, [presence of] nepotism, [and] racism" as being their three reasons for wanting to leave higher education. An assistant professor at a research institution reported, "Recently, one of my colleagues used their influence as a senior faculty member to publicly berate me. It felt like hazing." By implementing opportunities for interaction, where all faculty can feel supported and safe, but primarily for the Black GenX and Millennial faculty then there is an inherent support system established from the communities built which will promote the occurrence of the third pillar of the C.O.P.E © model.

Partnership Projects

Collegiality and academic collaborations are a cornerstone to higher education. For the Millennial, with appetites for team-oriented projects, promoting methods to establish partnerships is important. This is where the presence of University's divisions for Institutional Research and Effectiveness, Grants and Sponsored Research, or Community Engagement and Service Learning can provide support. In the initial on-boarding stages for new faculty, presenting the missions of each of these three divisions, or those similar to them, can be a simple piece for increased engagement. Presenting GenX and Millennial faculty with opportunities to apply their research agendas on campus or across the state and region through partnering with other faculty within their established communities or senior faculty will serve a double purpose. Primarily, it satiates the need for us to be team-players. Secondly, it gratifies our entrenched intellectualism and globalistic philanthropy. Lastly, it benefits the universities' fiscal needs by promoting the acquisition of external funding that will help to provide indirect cost rate funds or programmatic funding for community outreach or innovative enrichment for students. Partnerships also provide extended opportunities for the last component of the C.O.P.E. © model: mentorships.

Effective Mentorship

Mentorships can be either formal or informally, but the most effective of them are consistent formal models. There are numerous mentorship models, Five Phase Model (Cooper & Wheeler, 2010); Peer-Onsite-Distance model (Lewellen-Williams et al, 2006); Adaptive Mentorship© (Ralph & Walker, 2010); and the Mayo Model (Mayer et al., 2008) are a few formalized models. Regardless of the name of the model, when compared, each effective model has a combination of three elements: structured engagement/interactions, planning, and outcome/goal. While a number of researchers in the area of goal-setting will articulate that starting with the goal in mind is foremost to successful planning, in the area of effective mentorship models, it should be one of the last stages.

Effective mentorship begins with interaction. Developing a relationship built on personal and professional trust starts with first providing the mentor/mentee dyad the opportunity to get to know one another. While this seems intuitive in nature, without prior interactions of the dyad during the mentee's on-boarding there is a risk of the relationships being founded on unsubstantiated assumptions of career aspirations or goals. For example, one respondent of the 2016 study reported that while she was provided a mentor, the mentor encouraged her "not to work too hard." This concept of underachieving was philosophically offensive to the Black GenX faculty member whose ambition for establishing a research agenda was subsequently deflated. The mentee reported, from that point on, she felt she was not valued as a potential academic and member of the intellectual community of that institution. Had the structured engagement been a systematic component to the mentorship program, she may have felt more integrated into the academic community

of which she was already a minority. The second piece to encouraging interactions is through planning.

Planning is the important bridge between the necessary components of interactions and outcomes and goals. A mentor/mentee dyad should establish outcomes or goals of their professional relationship, most effectively in writing. Developing cognitive goals related to knowledge of institutional policies and procedures, affective goals related to collegial dispositions, or performance goals that can aid in retention and promotion like publications, funding acquisition, or research projects are various types of goals that could be developed by the dyad for the benefit of both the university and retention of the mentee. The depth of the effectiveness of the mentorship provides explicit and tacit knowledge for the mentee, but also for a mentor who may be of a different generation.

Conclusion

An underrepresentation of Black faculty, particularly young Black faculty of the millennial and later Generation X populations, present a problem for IHEs attempting to retain their college students of color who are becoming more and more millennial by nature. Those most frequently cited factors to minority student retention, interactions with and mentorship from faculty of similar cultural backgrounds, are increasingly difficulty for IHEs to address collectively when the traditional approach has been to categorize minority student retention and minority faculty retention as distinctly separate issues. By innovatively approaching the retention issue of young Black faculty through programmatic designs based on generational characteristics, there is an increased potential to retain the very faculty to whom millennial students of color will gravitate and identify. As respondents in the 2016 study demonstrated their generational traits which shaped their philosophical ideologies are driving forces behind their rationale for joining academe (Flynn, Kemp, & Page, 2013), as well as for leaving it. Research often presents the millennial generation as overindulged by Baby Boomer parents, and superciliously ambitious (Appelbaum, Serena, & Shapiro, 2004); however, it also confirms their deep philanthropic tendencies, value of globalism, and respect for competence over titles, which are frequently coated with ambition and undergirded by sheer tenacity. Recognizing the contributions of Black minds is more than a movement toward inclusivity, it is an acknowledgement that racial diversity is no longer the only cultural element by which IHEs should measure its commitment to innovation. The revolving door of academe for faculty of color has been spinning for nearly 40 years, according to the literature. Yet, very little has been done to address retention from an explicit manner such as C.O.P.E © model. Designed to address the generational traits of millennial and GenX faculty, C.O.P.E© provides a framework for IHEs to build upon its skeletal structure, a retention program distinctively aligned with its own institutional identity, mission, and brand while empowering individuals to feel as valued members to the interfacing of its future.

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Free Riding: A Multi-Cultural Study

William L. Tullar
Department of Management
Bryan School of Business and Economics
University of North Carolina at Greensboro
Greensboro, North Carolina

Vasyl Taras
Department of Management
Bryan School of Business and Economics
University of North Carolina at Greensboro
Greensboro, North Carolina

ABSTRACT

This study focuses on 86 free riders in a semester long team project. The individuals were drawn from the X Culture project. In the Spring Semester of 2016, 2,896 individuals from 563 teams found in 46 countries participated in an X Culture team. After the semester long project was almost over, we contacted the 86 free riders via e mail to survey them about their lack of participation with their teams. Using data from them, we were able to assess the individual and team attributes of free riding for this sample. From attribution theory, we hypothesized that most free riders would deny personal responsibility for their failure. Implications for a theory of free riding are discussed.

Self-Serving Bias in Free Riders

Virtual groups and teams are a daily part of organizational life in many settings. (e.g. Haines, 2014; Comu, S., Iorio, J., Taylor, J. Dossick, C., 2013; Kirkman, Rosen, Tesluk, & Gibson,, 2004). There have been a number of studies comparing face-to-face teams with virtual teams. For instance, De Pillis & Furumo (2007) randomly assigned university students to either a virtual or a face-to-face team. Both sets of teams were then assigned a project, and survey data were collected at the conclusion of the project. Virtual team members had lower average performance and lower average satisfaction than their face-to-face counterparts. They also concluded that *virtual teams were more likely to experience free riders* who do not carry their proportional share of the burden (De Pillis & Furumo, 2007). However great the performance loss in face-to-face teams have from free riding, virtual groups appear to have greater loss.

Virtual teams are popular because they are necessary to accommodate the disparate locations of busy people. In asynchronous, geographically distributed virtual groups, many of the social forces that we take for granted in face-to-face groups are weakened or absent as the Depillis & Furumo, (2007) results showed. Blaskovich's (2008) results suggest that virtual collaboration negatively affects group performance and that social loafing (or free riding) behavior may partially explain this result. She further points out that face-to-face teams and virtual teams are not interchangeable. Other recent studies in behavioral economics and business education suggest that preventing free riding and social loafing is important for group effectiveness and survival (Brooks & Ammons, 2003; Henrich, 2004).

As members of groups, participants, even in face-to-face groups, tend to feel less personally responsible for their group's actions than when they are working alone (Mynatt & Sherman, 1975; Whyte, 1991). When the task they are doing is a cognitive processing task, people are less willing to engage in effortful cognitive processing when they share responsibility for the task with others than when they are individually responsible (Petty, Harkins, & Williams, 1980; Weldon & Gargano, 1988; Chapman, Arenson, & Carrigan, 1993). The psychological mechanism that underlies these effects is probably diffusion of responsibility (Darley & Latané, 1968). It seems likely that responsibility is so diffused in virtual groups where face-to-face contact may never happen that it is easier for many people to fail to contribute in any significant way and their lack of contribution might go almost unnoticed.

Free Riding

The concept of "free riding," a term first introduced in the economics literature (Olson, 1965) and later extended to the management literature (Jones, 1984). Whereas social loafing is focused on the group's process loss, free riding refers to the behavior of individuals who participates minimally in the group task but benefits from the group's efforts. Free riding was defined by Stigler (1974; p. 359) as "a tendency for individuals to fail to participate in collectively profitable activities in the absence of coercion or individual incentives." Albanese and Van Fleet (1985) define free riding as a passive reaction to task conditions. A free rider shares in the benefits of the group's efforts but does not bear his/her share of the costs. The concept of Free Riding has branched out from its social psychological and economic roots to encompass marketing channels (Gundlach, 2013; Kalyanam & Tsay, 2013), computer networks (Moses, Dian & Ramadoss, 2012), economic behavior (Chowdhury, Lee, & Sheremeta, 2013), and game theory.

Self-Serving Attribution Bias

A self-serving attribution bias is any cognitive or perceptual process that is distorted by the need to maintain and enhance self-esteem. Individuals tend to attribute success to their own abilities and efforts, but they attribute failure to external circumstances. There do appear to be some factors that moderate the attribution. For instance, Larson (1977) showed that for participants working in pairs to complete interdependent outcome tasks relationally close pairs did not show the self-serving bias whereas relationally distant pairs did. Close relationships seem to place limits on self-serving bias. Duval & Silvia (2002) found that the self-serving attribution was moderated by the probability of improvement. That is, a person's perceived probability of improving his/her failure moderates self-failure attributions. When people perceive that there is little chance of improving performance, they will tend to make external attributions for failure. However, when people perceive that there is a substantial chance of improving performance, they often make internal attributions for failure.

Factors known to be related to free riding

Our previous unpublished research plus the free riding literature indicated that the best predictors of free riding in Global Virtual Teams were group size and group diversity. In general, we have found that larger groups tend to have more free riders, and more diverse groups also tend to have more free riders. Also, given the multi-cultural nature of our participants, we generally have seen individuals who are culturally aware tend to do better in our Global Virtual Teams. Moreover, sometimes English language skills can become a factor in individual success.

Hypotheses

Hypothesis 1:The most likely persons to free ride will be those with the lowest cultural intelligence.

Hypothesis 2: The most likely persons to free ride will be those with the lowest English language skills.

Hypothesis 3: The largest teams will be the ones that have the most free riding.

Hypothesis 4: The majority of free riders will blame their lack of participation on external circumstances beyond their control.

Hypothesis 5: Those free riders who accept blame for their failure will mention doing the exercise again or indicate that they would like to participate in a similar exercise.

Method

Sample

The participants for the present study came from a large multi-country global collaboration project. All materials and all measures were in English, even though for many of the participants English was a second language. The project was started in 2010, and since then, about 20,000 undergraduate, MBA, and EMBA students have participated. The present study relies on 2016 data representing 2,896 individuals who worked in 563 GVTs.

There is a widespread suspicion of research using students as participants for this type of research (Bello, Leung, Radebaugh, Tung, & Witteloostuijn, 2009). Using students in lieu of employees has been justifiably criticized because the findings obtained using student samples may not have external validity or be applicable to the real-world workplace. This lack of external validity stems from the fact that student and professional roles are quite different. The fact that students are typically younger than their corporate counterparts is usually a minor concern, unless age is a key variable in the model. However, the task design is a big issue. A typical student-based study is often limited to a simple in-class experiment. The student team members lack the interdependence or the outcome necessity commonly observed in organizations. The tasks such groups are assigned often take only minutes to complete and rarely take longer than a class session. The motivation and incentive structure for students are not analogous to a group of employees; compensation is usually not a factor, and students' livelihood is not at stake. Studies that focus on culture have the drawback that cultural diversity in student samples is often "artificial." It is artificial in the sense that it is either induced through priming (cf. Oyserman, Coon, Kemmelmeier, 2002), or even if the students come from different countries, they tend to be acculturated and adjusted to the host culture.

None of these concerns apply to the sample and study design used here. First, the personal and background types of diversity were well represented. In addition to obvious differences in personal attitudes, values, and beliefs, participants come from some 46 different countries, some 20 time-zones, and had obvious cultural and language differences. The participants represent fully 117 countries in the world attending 96 different universities. Each team was comprised of five to ten team members. There was some variation in the national composition of the teams, but in most teams each team member had a different home country and was at university in a foreign country at the time of the project. For research purposes, a small sample of teams were deliberately designed to be less nationally diverse with multiple team members from the same country on the team. A very small number of the teams were nationally homogeneous. In the whole sample, there was a modal number of seven members per team. The modal team had five different countries represented.

The project task and environment were designed to resemble the corporate world as closely as possible. The project took up the entire semester. Teams were begun with pre-project training and concluded with post-project presentations. The actual team problem itself lasted between eight and nine weeks. This is reasonably typical of the project length in the corporate world where the team members actually work together and communicate on a daily basis.

Students enrolled in certain courses at their respective universities were required to take part in the project as a major part of the coursework. The team assignment was random and students had no choice over the countries represented on their teams. This is similar to the corporate world where accepting a job offer is voluntary, but once in a job, one has little choice as to what projects to work on and with whom.

The project involved development of a solution to a real-life business challenge presented by an actual company. The task normally involved market research, market entry plan development, and/or product design. Each team's project was supervised by an instructor who had business consulting experience and had previously managed a regular business consulting project.

Just like the corporate world, the teams were given significant autonomy in terms of extent and type of communication methods, but all teams were introduced to and encouraged to use free collaboration tools, such as email, voice and video conferencing tools (e.g., Skype), document and collaboration platforms (e.g., Google Docs and Dropbox), and social media (e.g., Facebook and Google +), similar to what is commonly used in a corporate environment.

In the corporate GVTs, supervisors of team members at different locations have different priorities and evaluation methods. Similarly, in the present project, although there was a relatively high level of standardization of project expectations for all participants, some natural variation also occurred. Some professors (supervisors) emphasized different parts and others required additional components (e.g., a journal or an oral presentation).

For student participants, motivation was strong, and the project was effectively a temporary employment for the client organization. First, the project accounted for 20 to 50% of the course grade. A failure on the project often meant a failure in the course, with all resulting negative effects on future career prospects. The members of the best teams were invited to project participants' symposiums held once a year. Most students attending such symposiums received travel stipends. Additionally, some organizations offered post-market commissions, as well as prospects of internships and job offers. So there were considerable inducements for team members to perform well.

Lastly, the demographics of the present project participants was not meaningfully different from the demographics of their corporate counterparts. About half of the participants were MBA and EMBA students, and the rest were business students in their last or second last year of studies. The vast majority of the participants had at least some work experience, and many were employed at the time of the project. Some participants ran their own businesses or held managerial positions. These were the people who either already were employed or who would be organizational employees in a year or so and would comprise the core of business organizations.

Insofar as it is possible to do so, the project settings and work design were not materially different from those in functioning organizations. As noted above, the

validity of the use of student participants has been under scrutiny in many social science disciplines, including management (e.g., Dobbins, Lane, & Steiner, 1988), psychology (e.g., Wintre, North, & Sugar, 2001), and legal research (e.g., Bornstein, 1999). The emerging consensus of many social scientists is that authors who want to publish student-based results, must demonstrate that their results can be generalized to real-life situations on which they intend to shed light (Bello, Leung, Radebaugh, Tung & Witteloostuijn, 2009). We hold that the results of the present study do generalize to real life GVT projects in actual organizations.

Data

In the Spring Semester of 2016, 2,896 individuals from 563 teams found in 46 countries participated in an X Culture team. Each team was working on a project that they could eventually present to a company. Thus, the task had external validity, and many of the student participants were already employed. As a regular part of the study, data were kept on both individuals and teams. Individual level data gathered were: Free rider, Sex, age, English skills, Online collaboration experience, Readiness test (Readiness to participate in a Global Virtual Team), International experience, Cultural intelligence, and education level. Team level data included: Free rider, team size, geographical dispersion, Time zone dispersion, National diversity, Age diversity, English skills, Online collaboration experience, Readiness test, International experience, Cultural intelligence, and education. The team data were averages of the individual participants on the team.

At the end of the period of the study, all free riders who had been voted out of their teams because of non-participation were contacted by e mail. They were given a chance to recover some credit for the team project if they would answer some questions about their lack of participation. We asked the free riders to respond to the following questions:

1. Please describe your first impressions about your team members. How did you communicate the first time? Were you the one to contact them, or another team member contacted you first?
2. Your team says you were not investing enough time into the project; that you did not work very hard and your contribution was too small. Is this true?
3. At what point did you start having problems with your team? Did it all go well first and then the situation got worse, or was it not working well from the very beginning?
4. Can you please describe in your own words at what point did you start having problems with your team?
5. Can you describe the problems that caused you to not work very hard, or to stop working very hard on the X-Culture project?
6. Can you describe in your own words what prevented you from being a more active team member?
7. The problems you experienced: was it a one-time thing, or did the situation improve at some point and then got worse again?
8. Did your team have a team leader (formal or informal)? If so, was that person helping the situation or making it worse?
9. Did you experience any interpersonal conflicts in the team? If so, can you please tell what caused them and how were they resolved?
10. Do you think it was only you who had problems with the team, or there were more team members who were in the same situation?
11. Do you have a different opinion about your different team members, or they all are about the same?
12. If you had to do it again, what would you do differently this time?
13. Anything else you would like to share? Any comments, observations, suggestions?

We purposely asked open ended questions so we could get a wide feel for the attributions of free riders as possible. Eighty-six of the 96 total free riders responded to our questions. Two undergraduate students coded the free riders' responses as accepting responsibility for their failure, denying their responsibility for failure, or other when they could not say whether the person accepted or denied responsibility.

Since this was a unique sample, we also took the opportunity to extract as much descriptive material as possible from our free riders. An extensive search of the free riding literature did not turn up a single instance of comparable data on free riders. We feel that at a purely descriptive level, the results are interesting.

Results and Discussion

In Table 1 we see the descriptive results on Free Riders from the whole sample. Free riders tended to be more male than female, tended to have poorer English skills, tended to have less on line collaboration experience, tended to score poorly on the Readiness Test, and tended to have lower scores on the Cultural Intelligence Test. Of course, the significance of the correlations is of little note since the sample size is so large. What is important is the variance accounted for.

Table 2 shows the regression of Free Rider on the demographic and control variables. When we regressed Free Rider on the other eight variables, we found $R^2 = .069$, significant $p < .01$. This analysis shows that cultural intelligence has by far the strongest β weight. In fact, it was almost double the next largest weight. Clearly, those individuals who are higher in cultural intelligence have less of a tendency to free ride in this study. Also of note is the fact that more educated participants were *more* likely to free ride rather than less likely. Whereas it seems intuitive that males might be more likely to free ride than females and those whose readiness for the experience and English skills were less should be more likely to free ride, it seems odd that more educated participants are more likely to be free riders than less educated ones. These results may be interpreted as support for hypotheses 1 and 2.

When we analyzed the free rider phenomenon at the team level (see Table 3), the individual level results seem to be born out further. We note that here team size is the most predictive variable. Larger teams tended to have more free riders than smaller teams. The team level of analysis allows us to add some variables. Geographical dispersion, time zone dispersion, and national diversity all show significant positive correlations with free riding. What is interesting is that team diversity shows a fairly strong positive (among these correlations) relationship with free riding: more diverse teams tend to have more free riders. This is what Social Categorization Theory would predict. Jackson & Joshi (2004) found that sales teams that had

Table 2
Regression of Free Rider on demographic and control variables

	b	*SE*	β
Sex	-.172**	.032	-.086
Age	.000	.004	.004
English skills	-.096**	.023	-.069
Online collaboration experience	-.034*	.013	-.041
Readiness Test	-1.156**	.213	-.088
International experience	-.005*	.002	-.041
Cultural intelligence	-.529**	.055	-.154
Education	.181**	.036	.082
R^2		.069** (.067)	

Note. *b* = **unstandardized regression coefficient,** *SE* = **standard error of unstandardized coefficient, β = standardized coefficient. Value in parenthesis is adjusted** R^2**.** $^*p < .05$**,** $^{**}p < .01$**.**

Table 1
Individual Level Correlations

		1	2	3	4	5	6	7	8	9
1	**Free-rider**	--								
2	**Sex**	-.136**	--							
3	**Age**	.018	-.117**	--						
4	**English skills**	-.121**	-.050**	-.002	--					
5	**Online collaboration experience**	-.110**	.002	-.038**	.207**	--				
6	**Readiness test**	-.223**	.037**	.005	.225**	.125**	--			
7	**International experience**	-.005	.033**	.024**	.040**	-.001	-.004	--		
8	**Cultural Intelligence**	-.202**	.071**	.062**	.055**	.089**	.159**	.095**	--	
9	**Education**	.110**	-.050**	.297**	-.016	-.030**	-.010	-.003	-.006	--

Note. **Free rider was operationalized as the inverse of peer-rated effort; sex coded as 0 = male, 1 = female; education coded as 0 = undergraduate, 1 = MBA (or other professional degree).** $^{**}p < .01$**.**

the highest tenure, gender, and ethnic diversity were the lowest performing teams. Our results show that the most diverse teams tend to have the most free riders.

In an effort to see the additive effects of the team level variables, we regressed the free rider measure on the same set of variables. While the R2 for this regression is much stronger than that at the individual level, the most interesting feature of these results is the strength of Team Size as a predictor. While English Skills, the Readiness Test, and Cultural Intelligence still contributed significantly to the regression, Team Size is almost as big as all three of those combined. Clearly, larger teams have a much greater liability to have free riders. These results provide support for hypothesis 3.

So from these descriptive data, it is apparent that free riding is at least somewhat predictable. At both the individual and team levels, English Skills, the Readiness Test, and Cultural Intelligence are predictors of free riding.

Because of our effort to reach the free riders who were voted off their teams, we were able to get responses from 86 of the 96 free riders who were voted off the 563 teams. It is to the analysis of their answers that we now turn.

We first content analyzed the answers as a whole. Using Diction 6.0, we analyzed all of the participants' answers together to get a sense of the language they used. The results of this analysis are found in Table 5. The three variables where we expected our free riders to be different from normal student samples were the master variables Optimism, Certainty, and Realism. No matter what kind of attribution a free rider makes for his/her failure, the bare fact is that s/he failed. To reflect on such a failure is unlikely to produce positive ideation. Indeed, we find that the frequency of optimistic terms is more than one standard deviation below the mean. The two variables that seem to be contributing to the low score are inspiration (-1.23) and Denial (2.80). Whatever attribution is made, it is clear from this content analysis that free riders are low in using inspiration words such as faith, honesty, courage, dedication, wisdom, etc. On the same theme free riders did use an inordinate number of denial words such as aren't shouldn't, don't, no, nay, nothing, nobody, etc.

Table 3
Team Level Correlations

		1	2	3	4	5	6	7	8	9	10	11	12
1	Free-rider	--											
2	Team size	.274**	--										
3	Geographical dispersion	.065**	-.003	--									
4	Time zone dispersion	.096**	.133**	.796**	--								
5	National diversity	.265**	.480**	.230**	.529**	--							
6	Age diversity	.046*	.064**	-.172**	-.148**	-.009	--						
7	English skills	-.118**	-.115**	-.124**	-.097**	-.168**	.028	--					
8	Online collaboration experience	-.107**	.038	.056*	-.006	-.092**	-.021	.188**	--				
9	Readiness Test	-.107**	.055*	-.013	.136**	.182**	-.071**	.150**	.067**	--			
10	International experience	.060**	-.360**	.144**	.027	-.033	-.094**	-.014	-.133**	-.001	--		
11	Cultural intelligence	-.257**	-.178**	-.177**	-.020	.115**	.063	-.006	.035	.261**	.025	--	
12	Education	.118**	.195**	-.063*	-.069**	.098**	.244**	.005	.007	.085**	.006	-.033	--

Note. **Free rider was operationalized as the inverse of peer-rated effort; age diversity is the standard deviation of team members' ages; education coded as 0 = undergraduate, 1 = MBA (or other professional degree). *$p < .05$, **$p < .01$.**

Table 4
Team Level Free Rider Regression

	b	*SE*	β
Team size	.189**	.025	.338
Geographical dispersion	.000	.000	.109
Time zone dispersion	-.018	.020	-.051
National diversity	.253	.298	.038
Age diversity	.006	.005	.035
English skills	-.134*	.062	-.077
Online collaboration experience	-.030	.036	-.028
Readiness Test	-1.645**	.481	-.120
International experience	.002	.005	.011
Cultural intelligence	-.608**	.130	-.162
Education	.096	.049	.064
R^2		.254** (.244)	

Note. *b* **= unstandardized regression coefficient,** *SE* **= standard error of unstandardized coefficient, β = standardized coefficient. Value in parenthesis is adjusted** R^2**.** *$p < .05$, **$p < .01$.

This is precisely what we would expect from individuals who are generally trying to explain away their ejection from the team.

For the master variable Certainty, we find an interesting but not altogether consistent pattern. Tenacity has a Z score above 1.0 indicating a fairly high level of use of words like all forms of the verb to be, contractions such as he'll or they'll, and definitive verb forms such as has, must, do, etc. Moreover, free riders use a lot of leveling terms such as everyone, each, fully, and adverbs of permanence such as always, completely, consistently, etc. and resolute adjectives such as consummate, absolute, total, etc. Curiously, they also use a lot of terms of ambivalence such as almost, approximate, vague, somewhere, might, perhaps, etc. In this they are almost three standard deviations away from the mean. It is understandable that a person who has been rejected has some ambivalence about the team and the situation that rejected him/her.

As far as the attribution hypothesis, Table 6 shows the relative frequency with which free riders denied responsibility, accepted responsibility, or didn't mention responsibility in their answers. As can be seen from Table 6, the majority of free riders denied responsibility whereas those that accepted responsibility were in the minority. Duval and Silvia (2002) showed that failure is attributed internally when people can improve but the attribution is external when people cannot improve. Of the 40 free riders in this study who denied responsibility for their failure, all of them cited external circumstances as the reason. Of the 28 free riders who accepted responsibility for their failure, 20 of them suggested things they could do to improve their performance on future Global Virtual Team assignments. While only qualitative and descriptive, these results do lend support to hypotheses 4 and 5.

While these data are qualitative in nature, they also do tend to support Duval and Silvia's (2002) Dual Systems Theory. Since all of our free rider participants were failures, we cannot say anything about whether other group members attributed their success to internal factors. However, our data do seem to show that people who deny their personal responsibility for failure, do attribute their problems to external factors beyond their control such as sickness, technological problems, or lack of cooperation from other team members. Those that accepted responsibility for their failure, explained in one or more places in their answers how they could perform better if given another opportunity.

Conclusions

Free riding is a wide spread problem, especially in Global Virtual Teams. Our analysis shows that selecting individuals who have high levels of cultural intelligence, good English skills, and a demonstrated readiness to engage in multi-cultural activity. Women are to be preferred over men, other things being equal. Curiously, more educated individuals tended to have higher rates of free riding than less educated individuals.

At a team level, cultural intelligence once again proves to be an important factor in lowering the likelihood that teams will have one or more free riders. In addition, team size and team diversity were both associated with higher levels of free riding. Geographical dispersion and Time dispersion also played a role in that they were both slightly but significantly related to free riding.

The majority of Free riders in this study do exhibit self-serving bias. They flatly deny that their being ejected from their teams is their own fault. Instead, they blame a range of external factors over which they had no control. For those who accept responsibility for their failure, 71% gave explanations for how they could improve if given another chance.

Table 5
Diction 6.0 Scores
Three Diction Master Variable Scores

Variable	Frequency	% Words Analyzed	Normal Range Low	High	Standard Score
Optimism†	43.92		46.74	55.48	-1.20*
Praise	5.52	1.10	2.77	9.59	-.019
Satisfaction	2.30	0.46	0.47	6.09	-0.35
Inspiration	0.46	0.09	1.56	11.10	-1.23*
Blame	4.01	0.80	0.06	4.16	0.93
Hardship	8.58	1.72	1.26	10.48	0.59
Denial	17.34	3.47	2.57	10.35	2.80**
Certainty†	48.10		46.90	51.96	
Tenacity	42.45	8.49	23.32	39.76	1.33*
Leveling	12.98	2.60	5.02	12.76	1.06*
Collectives	13.44	2.69	4.04	14.46	0.80
Insistence	56.38		9.15	111.15	-0.07
Numerical	6.16	1.23	0.30	15.04	-0.20
Ambivalence	30.48	6.09	6.49	19.21	2.77**
Self-Reference	43.12	8.62	0.00	16.10	4.44**
Variety	0.41		0.45	0.53	-1.99*
Realism†	46.25		46.10	52.62	
Spatial	3.82	0.76	4.17	19.85	-1.04*
Familiarity	112.09	22.42	117.87	147.19	-1.39*
Temporal	19.46	3.89	8.,36	21.82	0.65
Present Concern	11.61	2.32	7.02	16.60	-0.05
Concreteness	8.63	1.73	10.70	28.50	-1.23*
Human Interest	16.25	3.25	18.13	45.49	-1.14*
Past Concern	6.25	1.25	0.97	6.19	1.02*
Complexity	4.17		4.31	5.01	-1.48*
Diversity	6.09	1.22	0.07	3.81	2.22**

†Master Variable, * Z > 1.0, **Z > 2.0

This study provides evidence for the antecedents of free riding in a large multi-national sample. It has implications for all organizations that employ Global Virtual Teams. Free riding does exact a high cost from such teams. This study provides some insight into the factors that can enable organizations to minimize free riding in the teams that they put in the field.

Table 6
Free Riders' Attributions

Response to Dismissal	Frequency	Percent
Denial	40	47.1
Acceptance	28	32.9
Other	17	20.0

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Financial Restatements by Industry and Their Market Impact

Ronald Stunda
Langdale College of Business Administration
Department of Accounting and Finance
Valdosta State University
Valdosta, Georgia

ABSTRACT

This study analyzes the market price effect of financial restatements, by industry and in total, in a pre-2002 versus a post-2004 regulatory environment. Regulations implemented during 2002-2004 (i.e., Sarbanes-Oxley, PCAOB Auditing Standard No. 2, SEC tightening of Form 8-K filing) altered the regulatory regime of auditing by shifting the oversight of audit firms from the AICPA to the PCAOB. These increased regulations may have brought about a change in the implications associated with releasing a set of financials. Investors' concerns over the integrity of financial reports report may have significantly changed after the regulation-setting period of 2002-2004.

Study results support prior pre-2002 studies that indicate minimal effect of financial restatements on security prices. And this is prevalent across industries. However, the assessment of post-2004 firm restatements indicate that financial restatements have a significantly positive effect on security prices for above average growth industry firms, and a significantly negative effect on security prices for below average growth industry firms indicating that investors do perceive post-2004 financial restatements differently between those two industry groupings.

The implication is that regulators and investor groups may be justified in their concern over the number of restatements subsequent to the passage of Sarbanes-Oxley, and other regulations affecting financial restatements, at least from the perspective of below average growth industry firms. Although the vast bulk of the restatements do not result from misbehavior by management, there seems to exist a negative perception by stockholders concerning some firms or industries that file financial restatements. As a result, investors tend to bid down the market price of such firms. These results hold implications for all firms contemplating financial restatement, particularly below average growth industry firms.

Introduction

This paper investigates whether financial restatements are more prevalent in certain industries, and the degree to which restatements impact the security prices of firms in selected industries. A large stream of literature examines the capital market effects of financial restatements (Anderson and Yohn 2002; Hribar and Jenkins 2004; Palmrose, Richardson, and Scholz 2004), their consequences for labor markets (Srinivasan 2005; Desai, Hogan, and Wilkins 2006; Kedia and Philippon 2009), and the associated legal costs (Palmrose and Scholz 2004; Karpoff, Lee, and Martin 2008). However, no research has attempted to quantify the implications of financial restatements by major industry.

In July 2002, Congress enacted the Sarbanes-Oxley Act (SOX)1 in response to various corporate scandals including Enron, WorldCom, Tyco, and Global Crossing. Interestingly, implementation of three key regulatory provisions occurred almost at the same time as SOX. PCAOB Auditing Standard No. 2 (for section 404 audits on internal controls over financial reporting (ICOFR)) was approved by the SEC on June 17, 2004. Second, PCAOB inspection reports of public company auditors were first disclosed in August 2004 (Chang, Cheng and Reichelt. 2010). Third, the SEC tightened the Form 8-K filing deadline from five to four days in August 2004. Hence, it can be seen that this time frame is a legislative watershed period for regulation which has the potential of impacting financial restatements (Chang, Cheng and Reichelt.

1 Pub. L. No. 107-204, 116 Stat. 745 (2010).

2010). These requirements may have in fact led to more financial restatement announcements (Public Company Accounting Oversight Board PCAOB- 2007).

The risks associated with auditing increased significantly in the period after 2004. Regulations implemented during 2002-2004 altered the regulatory regime of auditing by shifting the oversight of audit firms from the AICPA to the PCAOB. Also, Auditing Standard No. 2 lowers the risk threshold by mandating that the auditor examine all internal controls that could impact the occurrence of fraud that could have a material impact on the financial statements (Griffin and Lont 2010). This standard also results in higher costs for auditors regarding significant deficiencies in internal controls and reasonable assurance that no material weakness exists by defining a deficiency as significant and a weakness as material if there is more than a remote likelihood that a material misstatement will not be prevented or detected (Griffin and Lont 2010). Also, the insurance and other liability-related costs increased significantly during the post-2004 period (Rama and Read 2006).

Increased auditor risks and costs may have led to a rise in auditor conservatism and thus restatement of financial reports (Bryan-Low 2003). Hence, increased regulation may have brought about a change in the implications associated with releasing a set of financials. Investors' concerns over the integrity of financial reports report may have significantly changed after the regulation-setting period of 2002-2004.

Literature Review

Background of the restatement issue

The number of financial restatements has been a concern for regulators even before the increased regulation issue. In 2002, The General Accounting Office (GAO) conducted a comprehensive study of restatements from 1997 to 2002. The GAO found that the number of restatements grew from 92 in 1997 to 225 in 2001. The number of restatements grew even faster after that. A follow-up report by the GAO in 2005 reported over 650 restatements in that year. Taub (2010) finds that the number of restatements has remained high in subsequent years, with 725 being reported in 2009.

It is often assumed that a financial restatement is due to fraudulent behavior, however, there are other reasons far more likely than fraud. Plumlee and Yohn (2010) found four reasons that may be attributed to restatements. Those include: errors in the corporation's internal controls, intentional misrepresentation, problems from complex transactions, or a problem that arose from application of an accounting standard. In that study, the most common reason for restatement was found to be poor internal controls by the corporation. Williams (2012) finds that larger corporations (defined as greater than $1 billion in market capitalization) in particular, have developed stronger internal controls since the passage of added regulation, whereas smaller companies have been slower in this process. As a result, Badertscher (2013) discovers that because of greater internal controls, the numbers of financial restatements among larger firms has declined since 2002.

The Plumlee and Yohn study also analyzed the effect of restatements on net income. The study revealed that the majority of the restatements had a negative impact on net income. This confirmed a GAO study of 2006 which analyzed firms restating financials. The result of that study showed that approximately 40% of restatements were due to a revenue recognition problem, which resulted in lower income levels, while 20% of the restatements were due to an expense recognition problem, which resulted in lower income levels.

Regulatory concerns over restatements

The two regulators in the forefront of the U.S. capital markets are the Department of the Treasury and the Securities and Exchange Commission (SEC), and both are concerned with financial restatements. A report issued in 2008 by the Treasury Department detailed the changing nature of restatements (Scholz 2008). At about this same time, The SEC formed an Advisory Committee on Improvements in Financial Reporting (CIFR) to recommend ways to improve the usefulness of financial information to investors while reducing the complexity of the financial reporting system while minimizing restatements (CIFR 2008). One major recommendation resultant from this committee was the need to clarify guidance of financial restatements. The committee found restatements to be confusing to the average investor and as a result, sought to have them reduced in number. One way the committee recommended in accomplishing this dealt with materiality guidance. Under U.S. Generally Accepted Accounting Principles (GAAP), immaterial errors do not require restatement. CIFR believes that in some cases a quantitatively material error should be deemed immaterial if, for instance, the error relates to a business segment or one-time item that does not affect firm value or firm trends. CIFR also recommended that prior periods should not be restated for errors that are not material to those periods, even if the cumulative error is material in the current period.

Needless to say, these recommendations are controversial at the Financial Accounting Standards Board (FASB). Many market participants and investor groups do not want the current GAAP procedures of restating prior periods to correct errors to be changed. They believe that the CIFR's recommendations grant too much discretion over disclosure issues to the preparers, and will thus make financials even more difficult for interpretation by the user. However, many see the CIFR recommendations as a valiant effort to at least stem some of the financial restatement growth.

Studies involving restatement returns

Plumlee and Yohn (2010) made no attempt to associate the impact of restatements on security prices. Studies conducted by Hranaiova and Byers (2007) and Scholz (2008) did attempt to associate financial restatements with security prices in the pre-2002 environment and found that restatement announcements to be negligible on security prices. These studies confirmed the 2006 GAO study which also found restatements to have a minimal impact on firms' security prices, mainly because of fewer restatements involving abusive or aggressive accounting practices and more cases where firms are restating to correct minor or technical deficiencies.

Subsequent studies such as Gordon, Henry, Peytcheva (2008), Sun (2008), Hennes, Leone, and Miller (2007), and Swanson, Tse, and Wynalda (2008) also examine the effect of restatements on security returns in the pre-2002 environment and also find negligible association between restatement and security returns. In addition, they also evaluate very short time periods in their analysis (ranging from 2-5 years), and utilize a long window for the restatement announcement (ranging from 3 days to 3 weeks).

This study will expand on prior research by assessing the market effect of financial restatements in a pre-2002 versus post-2004 time frame, by industry. The pre-2002 time frame will consist of restatements made during the years 1994-2001, while the post-2004 time frame, which incorporates all regulations established between 2002-2004, will consist of restatements made during the years 2005-2012. The event window will center on the date that the restatement is made public. An event study will then be performed to assess market reaction to restatements made during these two time periods, and by industry. Since U.S. regulators have placed importance on how investors perceive financial restatements, this study will be the first to indicate just how, and to what extent investor groups interpret financial restatements, by industry, via stock price before and after implementation of significant regulation.

Deutsch (2016) finds that since the since the 2008 recession, the industries that drive growth in the U.S. are not necessarily the ones which drove it to the same extent prior to the recession. For instance, since 2010, four primary industries have led the way in job growth, investment and revenue in America. Those industries are; Healthcare, Technological Services, Banking/Finance, and Oil/Gas. At the same time, there are industries which have shown a precipitous drop in the same categories. Those industries are; Industrials, Utilities, Transportation, and Real Estate. As a basis of comparison, these eight industries are singled out for analysis in conducting this study.

Hypotheses Development

As previously noted, extant studies focusing on market reaction to financial restatements tend to primarily utilize data from a pre-2002 time frame. These studies show minimal impact on the security prices of corporations filing restated financials. The other aspect of these prior studies is that they used rather limited data points (i.e., average 3 year periods and 330 restatements). Limited data points have a tendency to bring into question the robustness of the results, in other words, can the findings be generalized across a broader perspective of both time frames and corporations? By utilizing both increased sample periods and total numbers of firms, the results of this study can then be compared to past studies and assessed for conformity. In addition, information obtained may be enhanced by industry evaluation. This gives rise to the first hypothesis, stated in the null form:

H1: The share price responses to unexpected earnings in a pre-2002 environment for firms, by industry, issuing restated financials are not significant.

As we have seen, the focus on restated financial statements by U.S. regulatory agencies is primarily in a post-2004 time period (after passage of significant regulatory rulings). This is the time frame under which current governances apply and investor groups are most concerned. It is this time period that we therefore hope to gain better insight on the impact of financial restatements and their relevance to security prices. Again, prior studies indicate minimal impact of restated financials on security prices prior to 2002. Do these finding hold in a post-2004 environment? The answer to this question would seem very important to regulators, investor groups, and managers. This gives rise to the second hypothesis, stated in the null form:

H2: The share price responses to unexpected earnings in a post-2004 environment for firms, by industry, issuing restated financials are not significant.

Sample Selection

The aim of this study is to investigate the share price behavior of publicly traded firms in the presence of restated financial reports in both pre-2002 and post-2004 time frames. Following Chang, Cheng and Reichelt (2010), 2004 is used as the delineation date between these two periods. The years 2002-2004 are excluded from analysis to eliminate potential confounding events of the passage of pertinent regulations during this time period. The pre-2002 period includes the years 1994-2001 and the post-2004 period includes the years 2005-2012. A database was assembled for the above time periods first utilizing the Audit Analytics database, which represents the 8 different industries and disclosed restatements for the study periods. A Lexis-Nexis and Electronic Data-Gathering, Analysis and Retrieval (EDGAR) search was then conducted to discover the appropriate release date of the restated financial report. The database was compiled to capture all announced restatements of quarterly and annual financial statements. These included restatements filed through amended financial statements as well as "stealth" restatements. Glass and Lewis (2006) report that as many as 45% of restatements do not use amended reports to restate financials, thus they are considered "stealth restatements." This study includes the "stealth" restatements in the database so as to not bias results.

Unlike past restatement studies (Palmrose, Richardson and Scholz 2004; Anderson and Yohn 2002), this study takes into consideration that there may exist overlaps between restatement events of issuers which would violate the independently identically distributed (IID) assumption set forth by Campbell and Wasley (1993) and later by Seiler (2000). To overcome this, an analysis is made of the database in order to eliminate any samples where the announcement dates overlap or "cluster." This not only permits adherence to the IID assumption but allows for more robustness in analyzing ultimate results. Table 1 indicates the breakdown of the pre-2002 and post-2004 samples, by industry, after eliminating overlap announcements.

Table 1
Study Sample by Sample Period

	Pre 2002	Post 2004
Healthcare	115	137
Technology	129	148
Banking/Finance	107	152
Oil/Gas	98	112
Industrials	142	156
Utilities	103	120
Transportation	77	89
Real Estate	42	71
All restatement announcements (excluding overlap announcements)	813	985

Methodology

Hypothesis One

The purpose of the test of the first hypothesis is to assess the relative information content of unexpected earnings of share prices in a pre-2002 environment for firms issuing restated financials. The model, at the top of the facing page, is used to evaluate information content.

The coefficient "a" measures the intercept. The coefficient b1 is the earnings response coefficient (ERC) for all pre-2002 industry firms in the sample (813). The coefficients b2 through b9 represent the ERCs for the specific industry firms with restatements in the sample. Coefficients b10, b11, and b12, are assessed for any potential contributions to the ERC for all restatement firms in the sample. To investigate the effects of the information content of the pre-2002 restated financials on ERC, there must be some control for variables shown by prior studies to be determinants of ERC. For this reason, the variables represented by coefficients b10 through b12 are included in the study. Unexpected earnings (UEi) is measured as the difference between the actual earnings (EAi) and security market participants' expectations for earnings proxied by consensus analyst following as per Investment Brokers Estimate Service (IBES) (EXi). The unexpected earnings are scaled by the firm's stock price (Pi) 180 days prior to the forecast:

$$UEi = Pi \ / (EAi - EXi) \qquad (2)$$

For each cross sectional sample firm, an abnormal return (ARit) is generated for event days –1, 0, and +1, where day 0 is defined as the restated earnings release date identified by EDGAR. The Dow Jones News Retrieval Service (DJNRS) is also reviewed to insure that confounding factors, such as change of corporate ownership or form, or management change, are minimized by excluding any firms which contain these events. The market model is utilized along with the CRSP equally-weighted market index and regression parameters are estimated between –290 and –91. Abnormal returns are then summed to calculate a cumulative abnormal return (CARit). Hypotheses 1 is tested by examining the coefficient associated with the unexpected earnings of pre-2002 firms restating financial reports. There are two possible conclusions; results may be noisy, or interpreted as being less beneficial to investors, which in this event, b1 through b9 <0, or these firms will possess an information-enhancing signal to the investor, which will result in b1 through b9 >0. Subsequent significance is then assessed.

$$\mathbf{CAR_{it}} = a + b_1UE_{it} + b_2UE_{it} + b_3UE_{it} + b_4UE_{it} + b_5UE_{it} + b_6UE_{it} + b_7UE_{it} + b_8UE_{it} + b_9UE_{it} + b_{10}MB_{it} + b_{11}B_{it} + b_{12}MV_{it} + e_{it} \qquad \mathbf{(1)}$$

Where:

$\mathbf{CAR_{it}}$ = Cumulative abnormal return firm i, time t
$\mathbf{a}$ = Intercept term
$\mathbf{b_1}$ = Unexpected earnings for firm i, time t, for all pre-2002 restatements
$\mathbf{b_2}$ = Unexpected earnings for firm i, time t, for all Healthcare restatements
$\mathbf{b_3}$ = Unexpected earnings for firm i, time t, for all Technology restatements
$\mathbf{b_4}$ = Unexpected earnings for firm i, time t, for all Banking/Finance restatements
$\mathbf{b_5}$ = Unexpected earnings for firm i, time t, for all Oil/Gas restatements
$\mathbf{b_6}$ = Unexpected earnings for firm i, time t, for all Industrial restatements
$\mathbf{b_7}$ = Unexpected earnings for firm i, time t, for all Utilities restatements
$\mathbf{b_8}$ = Unexpected earnings for firm i, time t, for all Transportation restatements
$\mathbf{b_9}$ = Unexpected earnings for firm i, time t, for all Real Estate restatements
$\mathbf{b_{10}}$ = Market to book value of equity as proxy for growth and persistence
$\mathbf{b_{11}}$ = Market model slope coefficient as proxy for systematic risk
$\mathbf{b_{12}}$ = Market value of equity as proxy for firm size
$\mathbf{e_{it}}$ = error term for firm i, time t

Hypothesis Two

The purpose of the test of the second hypothesis is to assess the relative information content of unexpected earnings of share prices in a post-2004 environment for firms issuing restated financials. A model similar to the one utilized for hypothesis one is again used for hypothesis two. The only difference is that the coefficients of interest (b1 through b9) measure post-2004 firms by industry in the sample (985 total). Similar metrics are used in order to keep comparisons between the two sample periods as similar as possible.

Ordinary least squares (OLS) regression is used to test the model for hypothesis one and two. Cross-sectional dependence and heteroskedasticity are not likely to be present in stock return metrics since sample firms are not affected by common event dates. (Binder 1985; Bernard 1987; Grammatikos and Yourougou 1990). However, whenever a set of multiple regression variables are employed, there is a probability of the presence of multicollinearity within the set of independent variables which may be problematic from an interpretive perspective. To assess the presence of multicollinearity, the Variance Inflation Factor (VIF) is utilized.

Results

Hypothesis One

As indicated in Table 2, the mean response coefficient b1, representing unexpected earnings for all financial restatement firms across industries, during the pre-2002 study period was -0.48 with a t-statistic of 0.29, and not significant at conventional levels. Each industry's response coefficient (b2 through b9), was also negative and not significant at conventional levels. The other control variables (b10 through b12) were not found to be significant at conventional levels. This finding indicates that when assessing the impact of restated financials on security prices in a pre-2002 time period, the association, even though negative, is not significant at conventional levels across industries. This supports prior research that finds that in a pre-2002 environment, there is minimal effect of the restated financial statements on firms' security prices. These results indicate that investors find restated financials in the time periods, before increased regulation, to be noisy and, therefore, not beneficial in providing any enhancing signal. It should be noted that industry distinction does not matter with respect to the outcome. Hypothesis one, which suggests that the security price effect of restated financials in pre-2002 time periods is insignificant, cannot be overturned.

In addition, whenever a set of multiple regression variables are employed, there is a probability of the presence of multicollinearity within the set of independent variables which may be problematic from an interpretive perspective. To assess the presence of multicollinearity, the Variance Inflation Factor (VIF) was utilized. Values of VIP exceeding 10 are often regarded as indicating multicollinearity. In the test of hypothesis 1, a VIP of 1.9 was observed, thus indicating the non-presence of significant multicollinearity.

Hypothesis Two

As indicated in Table 3, the response coefficient b1, representing unexpected earnings for all financial restatement firms across industries, during the post-2004 study period was 1.09 with a t-statistic of 1.88 and an associated p-value of .05. The analysis by industry indicates a different picture during the post-2004 time periods. For above average growth industries (i.e., healthcare, technology, banking/finance, and oil/gas...b2 through b5 respectively) results indicate the response coefficient to be positive and significant at the .01level, with the exception of the banking/finance industry, where the response coefficient is significant at the .05 level. For the below average growth industries (i.e., industrials, utilities, transportation, real estate... b6 through b9 respectively) results indicate the response coefficient to be negative, and significant at the .10 level. The other control variables were not found to be significant at conventional levels.

These findings indicate that when assessing the impact of restated financials on security prices in post-2004 time periods, the association is positive and significant for above average growth industries indicating that the response coefficients for these industries convey information content and that the information content is positively correlated to stock prices of respective firms in those industries, regardless of the fact that the financials have been restated. With respect to below average growth industries, the findings are just the opposite. The response coefficients for these industries are noisy and not beneficial to investors in providing information content since there is a negative correlation between the response coefficients and the stock prices of respective firms in those industries. As a result, hypothesis two, which suggests that the security price effect of restated financials in post-2004 time periods is insignificant, must be rejected.

The Variance Inflation Factor (VIF) is again utilized to assess multicolliniaerity in the regression model. In the test of hypothesis 2, a VIF of 1.7 was observed, thus indicating the non-presence of significant multicollinearity.

Table 2
Stock Price Effect of Pre-2002 Restated Financials By Industry

$$CARit = +b_1UE_{it} + b_2UE_{it} + b_3UE_{it} + b_4UE_{it} + b_5UE_{it} + b_6UE_{it} + b_7UE_{it} + b_8UE_{it} + b_9UE_{it} + b_{10}MB_{it} + b_{11}B_{it} + b_{12}MV_{it} + e_{it}$$

Variable	Industry	Avg. Mean	T-Statistic	Prob. p-value
b_1	Total Industry	-0.48	0.29	-
b_2	Healthcare	-0.21	0.38	-
b_3	Technology	-0.11	0.22	-
b_4	Banking/ Finance	-0.32	0.51	-
b_5	Oil/Gas	-0.12	0.49	-
b_6	Industrials	-0.86	0.59	-
b_7	Utilities	-0.68	0.44	-
b_8	Transportation	-0.91	0.91	-
b_9	Real Estate	-0.71	0.84	-

Table 3
Stock Price Effect of Post-2004 Restated Financials By Industry

$$CARit = +b_1UE_{it} + b_2UE_{it} + b_3UE_{it} + b_4UE_{it} + b_5UE_{it} + b_6UE_{it} + b_7UE_{it} + b_8UE_{it} + b_9UE_{it} + b_{10}MB_{it} + b_{11}B_{it} + b_{12}MV_{it} + e_{it}$$

Variable	Industry	Avg. Mean	T-Statistic	Prob. p-value
b_1	Total Industry	1.09	1.88	0.05
b_2	Healthcare	1.62	1.68	0.01
b_3	Technology	2.09	1.66	0.01
b_4	Banking/ Finance	0.38	1.80	0.05
b_5	Oil/Gas	1.22	1.65	0.01
b_6	Industrials	-0.29	2.20	0.10
b_7	Utilities	-0.97	2.12	0.10
b_8	Transportation	-1.36	2.09	0.10
b_9	Real Estate	–1.12	2.15	0.10

Conclusion

This study analyzes the market price effect of financial restatements, by industry and in total, in a pre-2002 versus a post-2004 regulatory environment. Restatement of financials has long been an issue with investor groups and regulators alike. Since the advent of the Sarbanes-Oxley Act, along with other regulatory measures, we have seen a general increase in restatements and this has furthered to alarm these investor groups and regulators. Previous studies have analyzed predominantly pre-2002 effects of restatements on firm security prices, and have found the effects to be negligible. The studies that have attempted to assess the post-2004 security price effects have had limitations in years studied, numbers of firms, and robustness of models. In addition, no previous study has attempted to ascertain the financial restatement impact from an industry perspective. This study overcomes many of these weaknesses by incorporating more study years (8 in each study period), more restatement firms (813 pre-2002 and 985 post-2004), eight total industries (4 representing above average growth industries and 4 representing below average growth industries), and greater robustness in the model (exclusion of overlapping announcements and tightening of the announcement window).

Study results support prior pre-2002 studies that indicate minimal effect of financial restatements on security prices. And this is prevalent across industries. However, the assessment of post-2004 firm restatements indicate that financial restatements have a significantly positive effect on security prices for above average growth industry firms, and a significantly negative effect on security prices for below average growth industry firms indicating that investors do perceive post-2004 financial restatements differently between those two industry groupings.

The implication is that regulators and investor groups may be justified in their concern over the number of restatements subsequent to the passage of Sarbanes-Oxley, and other regulations affecting financial restatements, at least from the perspective of below average growth industry firms. Although the vast bulk of the restatements do not result from misbehavior by management, there seems to exist a negative perception by stockholders concerning some firms or industries that file financial restatements. As a result, investors tend to bid down the market price of such firms. These results hold implications for all firms contemplating financial restatement, particularly below average growth industry firms.

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