ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

2023 REFEREED PROCEEDINGS

FEDERATION OF BUSINESS DISCIPLINES

March 2023
Houston, Texas

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

2023 Refereed Proceedings

Houston, Texas

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CONGRATULATIONS!

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Distinguished Paper Award

Assessing Sentiment of the Top 10 Tech Trends that Will Shape the Next Decade: A Sentiment Analysis of Social Media Posts

Benjamin Richardson, Brigham Young University

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

ABIS 2023 Program Overview

Thursday March 9, 2023

7:30 a.m. – 10:00 a.m.	**ABIS & ABC-SWUS Joint Breakfast**
8:30 a.m. – 10:00 a.m.	Session A: **ABC-SWUS & ABIS Joint Session – Distinguished Paper Presentations**
10:30 a.m. – 11:45 a.m.	Session B: **Information Systems Policy: Pedagogy, and Training I**
11:45 a.m. – 1:30 p.m.	**Lunch on your own** ***Executive Board Meeting (by Invitation)**
1:30 p.m. – 3:00 p.m.	Session C: **Research in Information Systems I**
3:30 p.m. – 5:00 p.m.	Session D: **Information Systems Policy: Pedagogy, and Training II**
5:30 p.m. – 7:00 p.m.	**FBD Presidential Welcome Reception**

Friday March 10, 2023

7:30 a.m. – 8:30 a.m.	**ABIS & ABC-SWUS Joint Breakfast**
8:30 a.m. – 10:00 a.m.	Session E: **ABIS Business Meeting *All Members Welcome***
10:30 a.m. – 12:00 p.m.	Session F: **Information Systems Policy: Pedagogy, and Training II**
12:00 p.m. – 1:30 p.m.	**Lunch on your own**
1:30 p.m. – 3:00 p.m.	Session G: **Research in Information Systems II**
3:30 p.m. – 5:00 p.m.	Session H: **ABC-SWUS & ABIS Joint Session - Innovative and Multidisciplinary Topics**

CONGRATULATIONS!

Recipient of the 2023 FBD Outstanding Educator Award

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Northwestern State University

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 9, 2023
(Thursday)

7:30 a.m. – 8:30 a.m. Window Box

ABC–SWUS and ABIS Joint Breakfast

We invite ABC-SWUS and ABIS Associations presenters and members to enjoy breakfast together!

ABC-SWUS or ABIS Association Name Badge Required for Entry

8:30 a.m. – 10:00 a.m. Joint Session with ABC-SWUS Window Box

SESSION A **ABC-SWUS and ABIS Joint 2023 Distinguished Paper Session**

Session Chairs:
Ashley Hall, Stephen F. Austin State University
Jason W. Powell, Northwestern State University

ABC-SWUS Distinguished Paper: *Undergraduate Business Majors' Perceptions of Skills Acquired During College*
Carol S. Wright, Stephen F. Austin State University
Lucia Sigmar, Stephen F. Austin State University

ABIS Distinguished Paper: *Assessing Sentiment of the Top 10 Tech Trends that Will Shape the Next Decade: A Sentiment Analysis of Social Media Posts*
Benjamin Richardson, Brigham Young University

10:00 a.m. – 10:30 a.m. Market Place

FBD Coffee Break

Please attend the poster sessions and visit the exhibits for information on the latest books and newest educational technologies. Let our exhibitors know how much we appreciate their continued support!

10:30 a.m. – 11:45 a.m. The Study

SESSION B **Information Systems Policy, Pedagogy, and Training I**

Session Chair: **Kimberly Merritt,** Oklahoma Christian University

Starbursts, Sampling, and the Central Limit Theorem: An Active Learning Approach
Mary Edith Stacy, Northwestern State University
Sarah Wright, Northwestern State University

Broadening Experiential Professional Development Constructs through the Metaverse
Doug Darby, Lubbock Christian University
Brian Burton, Abilene Christian University

Statistical Support for Synchronous Class Sessions in the MBA BI Course: Scaffolding for Student Success
Kimberly L. Merritt, Oklahoma Christian University
K. David Smith, Oklahoma Christian University

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 9, 2023
(Thursday)

11:45 a.m. – 1:30 p.m.	**Lunch on your own**

ABIS Executive Board Meeting and Luncheon by Invitation Only (Location: Dogwood)

1:30 p.m. – 3:00 p.m.	The Study

SESSION C **Research in Information Systems I**

Session Chair: **Mahesh Raisinghani**, Texas Woman's University

Crisis as a Catalyst: Enabling Digital Transformation Using Low-code and SaaS Technologies
Benjamin Richardson, Brigham Young University
Degan Kettles, Brigham Young University
Lilia Brown, Brigham Young University

Crisis-Driven Digital Transformation: Leveraging Cloud-based Contact Center as a Service Technologies
Benjamin Richardson, Brigham Young University
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Instant Banking Transactions 2023 to 2030 – A Presentation and Analysis of the Instant Payments Banking Systems in the US and Research to be Conducted
Joseph Steed, Brigham Young University
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How an AI Home Healthcare Provider could Revolutionize Healthcare: A Case Study
Hilena Mepinault, Texas Woman's University
Mahesh Raisinghani, Texas Woman's University
Lindsay Scanlan, Texas Woman's University
https://nsula-my.sharepoint.com/:b:/g/personal/powellja_nsula_edu/EaGAduHp8ClBvvm2ADKAU88BR-k_C4GYTHPevMyp3O_HLQ?e=sBSEjn

Effects of Regulations on Information Systems Use in Small Medical Practices
Joseph Mansour, University of Louisiana - Monroe
Craig Van Slyke, Louisiana Tech University

3:00 a.m. – 3:30 a.m.	Market Place

FBD Coffee Break

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ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 9, 2023
(Thursday)

1:30 p.m. – 3:00 p.m. The Study

SESSION D **Information Systems Policy, Pedagogy, and Training I**

Session Chair: **Kayla Sapkota**, Arkansas State University at Beebe

Microsoft Office Goodies: New Features to Help Business Students and Professionals
Lori Soule, Nicholls State University
Sherry Rodrigue, Nicholls State University
Betty Kleen, Nicholls State University

Using Bridged Assessment Strategies for Formative Skills Development
Doug Darby, Lubbock Christian University
Nathan Richardson, Lubbock Christian University

The Journey From Creation to Visualization: Building Projects That Promote Individualization and Collaboration
Shane Schartz, Fort Hays State University
https://use.vg/9Zp0k2

An Analysis of University Social Media Policy Composition and the Creation of a Functional List for Development
Kayla Sapkota, Arkansas State University at Beebe
James Vander Putten, Mercer University

Panel: Importance of Cyber Security for Accounting Businesses: Preparing CIS and Accounting Students
Ronnie Abukhalaf, Northwestern State University
Jason Powell, Northwestern State University
Eddie Horton, Northwestern State University

5:30 p.m. – 7:00 p.m. Market Place

FBD Presidential Welcome Reception

You are invited to attend this FBD conference-wide social event. Visit with long-time friends and make new ones as you enjoy light appetizers and a cash bar. Stop by to relax and wind down from the day's conference activities before heading out for the evening. To enter the Exhibit Hall, all persons older than six years of age are required to wear their conference or guest badge. All badges can be obtained from the Registration area during their open hours.

Name Badge Required for Entry

Enjoy your evening in Houston!

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 10, 2023
(Friday)

7:30 a.m. – 8:30 a.m. Arboretum 5

ABC–SWUS and ABIS Joint Breakfast

We invite ABC-SWUS and ABIS Associations presenters and members to enjoy breakfast together!

ABC-SWUS or ABIS Association Name Badge Required for Entry

8:30 a.m. – 10:00 a.m. Arboretum 4

SESSION E **ABIS Business Meeting** *** All Members Welcome ***

Session Chairs/ABIS President: Jason W. Powell, Northwestern State University

All members are invited to join us for our annual business meeting.

10:00 a.m. – 10:30 a.m. Market Place

FBD Coffee Break

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10:30 a.m. – 11:45 a.m. The Study

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Session Chair: **Qwontice McDowell,** Northwestern State University

The MOS Word Certification Exam – Historical Perspective with a Look to the Future
Julie McDonald, Northwestern State University
Mary Fair, Northwestern State University
Sue Champion, Northwestern State University

Effects of Gamification Training on Employees' Information Security Compliance
Mary Lind, University of the Cumberlands
Venkata Chaitanya Kumar Suram, University of the Cumberlands

A Case Study: Using Yellowdig To Promote Dialogic Interactions in an Asynchronous Online Course
James Ward, Fort Hays State University
https://nsula-my.sharepoint.com/:b:/g/personal/powellja_nsula_edu/EUAlS5otZ_lAlnaco8lR6foBno7LOClCdAvyBkpbZEp7XA?e=WwbC5n

A Comparison of COVID-19's Effects on Study Hours Among Business Students by Gender, Age, Major and Classification
Weiwen Liao, Northwestern State University
Ronnie Abukhalaf, Northwestern State University
Jason Powell, Northwestern State University
https://nsula-my.sharepoint.com/:v:/g/personal/powellja_nsula_edu/EW9As_CNQCVCmh_QcGkjxqIB8n6BHXvdc9p_5MXHH9aOwA?e=QhuKC6

March 10, 2023
(Friday)

10:30 a.m. – 11:45 a.m. – continued — The Study

CompTIA ITF+ Certification in an Introductory CIS course
Qwontice McDowell, Northwestern State University
Sarah Wright, Northwestern State University
Mary Edith Stacy, Northwestern State University

12:00 p.m. – 1:30 p.m. — **Lunch on you own**

Enjoy local cuisine in Houston!

1:30 p.m. – 3:00 p.m. — Arboretum 4

SESSION G **Research in Information Systems I**

Session Chair: **Carla Barber,** University of Central Arkansas

Perceived Effectiveness of Computer-Mediated Channels for Persuasion: A Partial Replication and Extension
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Jeanine Turner, Georgetown University

Securing the Vote: Blockchain & Election Security
Daniel Gordy, Northwestern State University
Eddie Horton, Northwestern State University
David Horton, Northwestern State University

Does One's Sex Impact Pay in Public Business Colleges - Comparing Pre/Post-COVID Years (2018 vs. 2021)
Kaye McKinzie, University of Central Arkansas
Samira Nichols, University of Central Arkansas
Carla Barber, University of Central Arkansas

The Time Management Practices of Business Majors: Comparing Survey Responses Before, During, and After the COVID-19 Pandemic
Marcia Hardy, Northwestern State University
Jason Powell, Northwestern State University
Lily J. Pharris, Northwestern State University

Public Knowledge Assessment of Cybersecurity Prior To COVID-19
Joseph Thomas, University of Central Arkansas
James Downey, University of Central Arkansas
Carla Barber, University of Central Arkansas

3:00 p.m. - 3:30 p.m. — Market Place

FBC Coffee Break

Please attend the poster sessions and visit the exhibits for information on the latest books and newest educational technologies. Let our exhibitors know how much we appreciate their continued support!

ASSOCIATION OF BUSINESS INFORMATION SYSTEMS

March 10, 2023
(Friday)

3:30 p.m. - 5:00 p.m.	Joint Session with ABC-SWUS	Arboretum 5

SESSION H **Innovative and Multidisciplinary Topics**

Designing an Online Interpersonal Business Communication Course
Marcel M. Robles, Eastern Kentucky University

Incorporating Artificial Intelligence Sentiment Analysis into the Business Communication Curriculum
Jamie Keith Humphries, Stephen F. Austin State University
Lucia Sigmar, Stephen F. Austin State University

A Review of Recent Laws and Cases in the Crypto Asset Space
Mary Fair, Northwestern State University
Carmella Parker, Northwestern State University
https://youtu.be/83aiK_rqNbE

Virtual Reality and the Communication Classroom
Trey Guinn, University of the Incarnate Word
Susanna Alford, University of the Incarnate Word

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Please make plans to join us in Galveston for our 2024 conference.

Moody Gardens Hotel & Convention Center
April 10 – 13, 2024

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ASSESSING SENTIMENT OF THE TOP 10 TECH TRENDS THAT WILL SHAPE THE NEXT DECADE: A SENTIMENT ANALYSIS OF SOCIAL MEDIA POSTS

Benjamin Richardson, Brigham Young University, benjam.rich@gmail.com

ABSTRACT

Sentiment analysis tools may be employed to evaluate aggregate trends in public perception among vast numbers of individuals by harnessing data publicly available on social media platforms. This study leverages such a tool to contribute to our understanding of the contemporary technological landscape by revealing sentiment surrounding the ten most prominent and transformational technology trends. The findings from this study provide critical contexts which may inform individuals, organizations, and educators of the current state of public opinion surrounding the trends of interest, which shifts in the technological landscape should be carefully monitored into the future, and what concepts and technologies may be worthwhile to adopt, implement, and teach.

INTRODUCTION

As the number of available and impactful technologies continues to proliferate, organizations, educators, and individuals may be overwhelmed by the ever-increasing scope of information technologies and their directions in the marketplace. While the technological landscape evolves, technologies that were once widely used may continuously fade as new, more advanced and impactful systems become integrated into organizations and IT curriculums. The economic impact of focusing on technologies with limited capabilities and fading potential may be catastrophic, and prior research has shown that IT managers indicate that it is difficult to accurately forecast advances and trends in IT (Adomavicius, et al., 2008). As a result, understanding the future impact, potential profitability, and public sentiment of promising technologies is crucial for the success of both organizations who seek to employ such technology and the educational institutions that teach it.

This paper seeks to address these issues by employing an analytics-based approach and performing natural language processing—in the form of a parsimonious rule-based model for sentiment analysis—to evaluate public sentiment of the technologies, that, according to research performed by McKinsey and Company, are behind the top ten trends in technology that will shape the coming decade. This study evaluates a sample of 335,586 randomly selected text-based posts from the social media site Twitter, covering a time period from January 2019 through June 2022, or 3.5 years. Each post, or tweet, in the dataset contains a reference to one of the technologies of interest, and by grouping the posts by trend and technology, the public sentiment towards such topics over time is analyzed.

The content in this paper is organized to delineate the background, methods, and findings of the study. The paper begins by providing a literature review that relates the precedent for this research. It then describes in detail the background and technical details of the top ten technology trends, which are followed by an explanation of the methods used in the data gathering process.

An analysis section describes the statistical and analytical details of the study. A discussion of the study's findings is then accompanied by a conclusion that discusses the study's limitations and potential for future research.

LITERATURE REVIEW

Sentiment Analysis

Over the last decade, social media platforms such as Twitter, Facebook, and Instagram have become increasingly popular, and as a result, saturated with user data. Due to the proliferation of these social platforms, combined with the low barrier for posting messages, opinions and sentiments from social media often provide the most timely and inclusive information (Yue, et al., 2019). This information may be extracted and analyzed to explore user habits, tendencies, feelings, and preferences. A plethora of prior research exemplifies this method of data mining by extracting text from user posts and leveraging the free text to analyze individual opinions toward entities such as events, issues, individuals, topics, products, organizations, and even attributes (Gupta, Sharma, & Chennamaneni, 2016; Liu, 2010, Neri, et al., 2012).

Often referred to as opinion mining, sentiment analysis is a child of natural language processing, machine learning, and computational linguistics (Yue, et al., 2019). While it stems from several broad categories of data science, sentiment analysis is primarily concerned with extracting the attitude of the author of the text about a specific topic. The polarity of attitude, or sentiment, is labeled with a score of positive, neutral (apathetic), or negative, and is often reported as a composite score of the three (Stieglitz & Dang-Xuan, 2013). The analysis in this paper follows the same scoring model.

While tools such as Google Trends allow users to evaluate the search volume of certain topics (Choi, & Varian, 2012), sentiment analysis tools for social media can provide unique insights from both individual and aggregate user data to assess not only the quantity of posts about a certain topic (i.e., the extent of discussion generated associated with the topic of interest), but also evaluate the state of public perceptions toward the topic (El Barachi, AlKhatib, Mathew, & Oroumchian, 2021). This capacity uniquely positions data scraping with sentiment analysis to be able to provide distinctive insights associated with public opinion.

The data source employed in this study comes from Twitter, one of the premier global social networking services. Twitter is a microblogging platform where account holders may post or send messages limited to 280 characters called "tweets", follow the activity of other users, interact with other user messages, and follow trending topics that are labeled with '#', or hashtag. In the first quarter of 2019—at the beginning of this study—the number of monthly active Twitter users worldwide was approximately 330 million (Dixon, 2022). Twitter is a prime resource for research that investigates public opinion because, as described by prior literature, web 2.0 platforms such as Twitter create a naturalistic setting that is designed to generate free flow content which often reveals previously unknown effectual insights beyond that which may be discovered in survey-based questionnaires (Makarem & Jae 2015; Ghose & Ipeirotis, 2009). Additionally, tweets are generated in real-time, often with exceptional levels of anonymity, and therefore minimize the probability of response bias in the sample. (Peterson & Wilson, 1992;

Gupta, Sharma, & Chennamaneni, 2016). Furthermore, methods in sentiment analysis are not subject to the recall biases often associated with traditional quantitative and qualitative measurements (Rylander et al. 1995). These reasons position text-mining on social platforms, specifically Twitter, as a viable solution for performing market research and seeking to understand raw, unbiased public sentiment.

Top 10 Tech Trends

According to a comprehensive study of technological change performed by MIT, the pace of technology change and adoption varies by technological area, however, high-impact domains that are based on software and algorithms are growing at rates reaching over 40% each year (Murray, 2021). Technologies that improve the fastest win the market and ultimately become key players in the global technological landscape (Singh, Triulzi, & Magee, 2021). McKinsey & Company, a global research and management consulting firm, predicts that society will experience more technological progress in the coming decade than it did in the preceding 100 years put together (Fleming, 2021). As these technologies evolve, it's critical to understand which technologies possess the most promise, what their impact will be, and to what degree they are accepted and leveraged by both industry and individuals.

Research published by McKinsey & Company examined a range of factors to identify the trends in technology that will have the greatest applicability across industries and transformational influence in the coming decade (The Top Technology Trends). For each trend a momentum score was calculated based on the growth rate of the technologies underlying the trends. The growth rate was derived from an in-depth analysis of six proxy metrics: patent filings, research publications, online search trends, news mentions, private investment amount, and the number of companies making investments into those technologies. The scores were then compiled into a single composite score for each trend (McKinsey & Company, 2022). The technologies behind the top ten trends presented by McKinsey are used as the topics of interest in this study:

Trend 1: Next-level process automation and virtualization

Automation will affect tasks in virtually all occupational groups in the future (Muro, Maxim, & Whiton, 2019) and McKinsey predicts that "by 2025, more than 50 billion devices will be connected to the Industrial Internet of Things (IIoT), and robots, automation, 3D-printing, and more will generate around 79.4 zettabytes of data per year" (McKinsey & Company). Such advances will have incredible implications for the future of work and the profitability of organizations (West, 2018). In this study, automation and virtualization, and the public sentiment related to its underlying technologies, is investigated by extracting posts containing references to #Robotics and #3D-printing.

Trend 2: The future of connectivity

The second trend brings together fifth-generation (5G) broadband cellular networks and the Internet of Things (IoT) to "enable faster connectivity across longer distances, with exponentially faster download and latency (the time it takes to retrieve data) reduced to nearly nothing" (The Top Technology Trends). Having unprecedented speeds of connectivity paired

with an ever-increasing number of IoT devices and sensors will have significant implications for advances in connected health (e.g.., remote monitoring, reliable telemedicine, transmission of imaging files, etc.), the development smart cities (e.g., air/water quality monitoring, surveillance, and smart buildings), and the digitization of manufacturing processes and smart-grid systems (Javaid, 2018; Minoli, & Occhiogrosso, 2019). The importance of both IoT and 5G is paramount to the success and proliferation of advanced connectivity, and as such, this analysis investigates the sentiment related to #5G and #IoT.

Trend 3: Distributed infrastructure

Trend three introduces the further development and integration of off-premise computing, more often known as cloud and edge computing. Such technologies enable organizations to offload significant costs associated with IT management including computing, storage, and security, while also allowing organizations to improve scalability, speed, and resource maximization (Saini, Upadhyaya, & Khandelwal, 2019). McKinsey predicts that by 2022, approximately 70 percent of organizations will employ multi cloud-management technologies, tools, and processes, which characterize distributed IT infrastructures. Such a shift toward distributed IT infrastructure will be reflected in the development of "software sourced by companies from cloud-service platforms, open repositories, and enterprise software-as-a-service (SaaS) providers—from today's 23 percent to nearly 50 percent in 2025, if current trends continue, with the potential for this to jump to 80 percent if adoption accelerates" (Jagirdar, et al., 2013; The Top Technology Trends). Public sentiment of distributed infrastructure is assessed by evaluating the trends in #CloudComputing.

Trend 4: Next-generation computing

Next-generation computing reflects the rapid approach of quantum computing and neuromorphic chips. Quantum computing leverages quantum mechanics to solve computational problems with unprecedented efficiency and capability (Li, et al., 2001). The advent of neuromorphic chips, or application-specific integrated circuits (ASICs), helps overcome many of the hardware limits and shortcomings of traditional CPUs and will enable neuromorphic computing that imitates the human brain and nervous system (Greengard, 2020; Schemmel, 2022). According to McKinsey & Company, "next-generation computing could help find answers to problems that have bedeviled science and society for years, unlocking unprecedented capabilities for businesses. It also promises to cut development time for chemicals and pharmaceuticals with simulations, accelerate autonomous vehicles with quantum AI, and transform cybersecurity—all while reducing hardware costs in IT, quickening machine learning, and enabling more efficient searching of unstructured data sets" (The Top Technology Trends). This study aims to evaluate the sentiment associated with next-generation computing by analyzing trends associated with #QuantumComputing and #NeuromorphicComputing.

Trend 5: Applied AI

Applied AI in practice means the application of artificial intelligence methods as "tools to advance or improve a system in a given domain; for example using AI methods to improve the weather forecasting system in meteorology, increase the efficiency of warehouse logistics in the

storage and shipping industry, obtain earlier diagnosis of diseases in medicine, or in the I&M domain, reduce complexity of a measurement method or increase accuracy of a measurement instrument" (Khanafer & Shirmohammadi, 2020). The technologies behind applied AI are diverse in nature, but according to McKinsey & Company, some of the most impactful technologies for the next decade include computer vision, which helps machines identify images, videos, or text and translate it into actionable concepts for decisions, and natural language processing, which enables anthropomorphic interactions between humans and technologies (Birant, 2021; Meera & Geerthik, 2022). Researchers expect that in the near future, due to increased development of the technologies behind the AI methods, AI will likely match or possibly surpass human intelligence (Nowak, Lukowicz, & Horodecki, 2018). The sentiment surrounding Applied AI is evaluated by extracting tweets associated with #AppliedAI and #AI, #ComputerVision, and #NaturalLanguageProcessing.

Trend 6: The future of programming

The sixth trend concerns the rise of Software 2.0, in which developers are replaced by neural networks that leverage machine learning to develop software (Dilhara, Ketkar, & Dig, 2021; McKinsey & Company). The advent of Software 2.0 and its gradual implementation will introduce novel ways of composing software while minimizing complexity, reducing the need for human programmers, and creating iterative and efficient code (Ratner, Hancock, & Ré, 2019; The Top Technology Trends). Software 2.0 will have an increasingly significant impact in domains such as self-driving vehicles (Tian, et al., 2018), cybersecurity (Cai, 2020), drug discovery and development (Chen, et al., 2018), language translation (Nassif, et al., 2019), financial services (Roy, et al., 2018), and software engineering (Hellendoorn, 2018; Wan, 2021). Public sentiment surrounding Software 2.0 is assessed in this study by evaluating posts containing #MachineLearning.

Trend 7: Trust architecture

In a world where cyberattacks are increasingly a threat to corporations, governments, and individuals, establishing a trust architecture, characterized by stalwart cybersecurity defenses and distributed-ledger technologies, such as blockchain, is a necessity. According to a report by IBM, more than 8.5 billion records were compromised in 2019, resulting in a 200% increase in exposed data reported year over year; such malicious activity is expected to continue to rise without the implementation of vitalized cybersecurity infrastructure. Technology such as blockchain, a digitally decentralized and distributed ledger that maximizes the security and immutability of transactions and records (Monrat, Schelén, & Andersson, 2019; Sunyaev, 2020), paired with "zero-trust security" approaches to cybersecurity are key to establishing effective trust architecture (Rose, et al., 2020; Kerman, 2020). This trend is analyzed by extracting tweets containing references to #Cybersecurity and #Blockchain.

Trend 8: The Bio Revolution

Advances in biotechnology—fueled by a combination of the accelerated development of computing, advances in biological science, and the maturation of AI—are giving rise to a new wave of innovation dubbed the Bio Revolution. The Bio Revolution is currently embodied in a

variety of technologies that are poised to evolve in the coming decade, including, but not limited to, biocomputing, molecular technologies, and biomachines (McKinsey & Company). Although accompanied with valid ethical concerns, the Bio Revolution is in a position to penetrate and revolutionize not only industries related to healthcare, but also agriculture, materials, informatics, and consumer goods (Chui, Evers, & Zheng, 2020; Finbow, 2022). Sentiment and public circulation of the concepts and trends surrounding the Bio Revolution is evaluated in this study by gathering tweets associated with #BioEngineering #BioRevolution and #BioComputing.

Trend 9: Next-generation materials

The ninth trend reflects the advance of next-generation materials, such as nanomaterials, and the subsequent ascendance of nanotechnology. The contemporary development of nanoscience is an outcome of the relatively new-found means to observe and control structures at small size and time scales, coupled with the development of computational capabilities that are effective at small scales (Ramesh, 2009). The nature of nanomaterials and nanotechnology as lightweight, responsive, and sometimes even programmable, sets the stage for advancements in manufacturing, information technology, aerospace, and medicine and pharmaceuticals (Emerich, & Thanos, 2003; Hulla, Sahu, & Hayes, 2015). #Nanomaterials and #Nanotechnology serve as the topical references for all Twitter posts extracted concerning next-generation materials.

Trend 10: Future of clean technologies

The final trend addresses the rapidly growing need for renewable and clean-energy generation and ecologically friendly technologies. Due to the increased risks associated with climate change (Thuiller, 2007), clean technologies look to disrupt the energy sector and pave the way for a responsible and sustainable future (Behera & Prasad, 2020). According to McKinsey & Company, such solutions may include "systems for smart-energy distribution in the grid, energy-storage systems, carbon-neutral energy generation, and fusion energy" (The Top Technology Trends). Having an abundant supply of green energy will be key to sustaining the current rate of exponential technological growth (Midilli, Dincer, & Ay, 2006). General trends in sentiment towards clean technologies are measured by extracting posts containing references to #CleanTech.

METHODS

This study employs an inductive methodology that can be classified into four core steps: 1) identify the relevant, trend-specific hashtags prior to data collection 2) leverage custom python code to scrape the text-based posts from Twitter 3) employ a parsimonious rule-based model (VADER) to classify the sentiment polarity of each tweet 4) perform exploratory analysis to evaluate public sentiment towards each trend. *Figure 1* provides an overview of the research process.

Figure 1: Sentiment scraping research framework

Step 1

Prior to data collection it was imperative to consider each of the ten tech trends of interest and which technologies behind each trend this study would target to accurately assess the associated sentiment. Generally, each trend is too broad of a topic to accurately assess the sentiment towards it, and because this research is primarily interested in the technologies fueling each trend, the study addressed specific hashtags that would narrow the number of results. For example, trend six, the future of programming, was found to be too broad; by evaluating all posts associated with #programming, the resulting sentiment proved to be increasingly general and failed to provide meaningful insights. By narrowing the scope of each trend to evaluate at least one core technology fueling each trend, the sentiment associated with each trend became more recognizable and specific insights could then be drawn.

Additionally, some technologies behind individual trends failed to generate sufficient discussion on Twitter, and as a result were not pursued following an initial data pull. For example, to assess the sentiment behind Trend 6, the study initially wanted to look at any posts associated with Software 2.0. However, in the 3.5-year period from which the data was pulled, only 65 posts contain references to Software 2.0, a mere 37 of which are in English. As a result of the nominal sample size, any topic resulting in less than a thousand English tweets is not included. The hashtags of interest associated with each trend can be found in *Table 1*.

Trend	**Technologies of Interest**
Trend 1: Next-level process automation and virtualization	#Robotics, #3D-printing
Trend 2: The future of connectivity	#5G, #IoT.
Trend 3: Distributed infrastructure	#CloudComputing
Trend 4: Next-generation computing	#QuantumComputing, #NeuromorphicComputing
Trend 5: Applied AI	#AppliedAI, #ComputerVision, #NaturalLanguageProcessing

Trend 6: The future of programming	#MachineLearning
Trend 7: Trust architecture	#Blockchain, #Cybersecurity
Trend 8: The Bio Revolution	#BioRevolution/#BioComputing, #BioEngineering
Trend 9: Next-generation materials	#Nanomaterials, #Nanotechnology
Trend 10: Future of clean technologies	#CleanTech

Table 1: Technology trends and their associated underlying technologies

Step 2

To scrape the tweets associated with the chosen topics an iterative python script was developed. The code leverages several python packages and libraries including snscrape which serves as a non-API scraper for social networking services and enables the scraping of user profiles, hashtags, searches, and relevant posts based on specific topics (Snscrape). The script gathered up to a maximum 25 tweets each day, for each topic, over the 3.5-year period from January 2019 through June 2022. Any tweets associated with the topic were then compiled into a dataframe that was then output to a database for analysis.

Step 3

Another key functionality of the script was classifying the sentiment associated with each post. Obtaining accurate sentiment scores was paramount for the actionability of this study. A wide range of different scoring algorithms and machine learning pipelines were tested to find and employ the most accurate scoring model. This study leverages the Valence Aware Dictionary for sEntiment Reasoning (VADER), a sentiment lexicon that is a simple rule-based model for general sentiment analysis. The details surrounding the development, validation, and evaluation of VADER can be found in "VADER: A Parsimonious Rule-based Model for Sentiment Analysis of Social Media Text." The VADER lexicon performs exceptionally well in the social media domain, which uniquely positions this lexicon for use in this study. "The correlation coefficient shows that VADER (r = 0.881) performs as well as individual human raters (r = 0.888) at matching ground truth (aggregated group mean from 20 human raters for sentiment intensity of each tweet). Surprisingly, when the classification accuracy is further inspected, it's evident that VADER (F1 = 0.96) even outperforms individual human raters (F1 = 0.84) at correctly classifying the sentiment of tweets into positive, neutral, or negative classes" (Hutto & Gilbert 2014).

Each post scraped from Twitter was ran through the VADER model, and on a scale from zero to one, gathered the level of negativity, positivity, and neutrality of each post. Those three scores were then aggregated into a compound score ranging from -1 (very negative), 0 (netural), to 1 (very positive). See *Table* 2 for an example of this scoring model. The example tweet is scored

with varying levels of negativity, neutrality, and positivity, ultimately resulting in a slightly negative sentiment score.

Example Tweet Text	Negative	Neutral	Positive	Compound
Five things that shook our world of #healthcare #3dprinting #bioprinting #AnnualReview of #news, gossips, wins and losses {*link*}	0.255	0.598	0.147	-0.1779

Table 2: Example of a Tweet and its associated sentiment scores

Step 4

The final methodological step was taking the scored topics and aggregating them over time to identify key patterns and insights into the tech trends. The quantity of tweets associated with each trend, the general sentiment, and the sentiment over time was evaluated. This inductive methodology prepares the data for effective analysis and pattern recognition. A regression was performed to establish the correlation coefficient and test the strength of the relationship between quantity of tweets and the sentiment scores for each trend.

FINDINGS

Upon analyzing and aggregating the 355,586 posts scraped from Twitter over the 3.5-year period, several prominent patterns that may have significant implications for our understanding of the technology trends of interest were discovered. The tweets were first aggregated by the technologies underlying the trends and took counts of the number of tweets associated with each trend. That number was then averaged by the number of terms searched for each topic. The resulting totals, as seen in *Figure 2*, provide insights into the prevalence, popularity, and intensity of the conversation surrounding each technological trend.

With a distribution of posts per topic ranging from 29,878 total tweets to a minimum of 10,313, it's clear that certain topics have historically generated far more discussion on the forum than others. Because the code gathered up to 25 tweets per day, for each day over the 3.5-year period from January 2019 through June 2022, the maximum number of total tweets that any given topic could have generated over that time period is approximately 31,938. Trends 1, 3, 6, 7, and 10 all fall far above the average of 22,141 tweets, suggesting that the technologies underlying those tech trends are, on average, generating significantly more discussion on Twitter. The comparable prevalence of these 5 topics not only suggests that these technologies are consistently talked about, but that they are also prevalent parts of the current technological landscape. For example, the discussion surrounding Trend 1 - Automation and Virtualization, is a conversation that has been consistently discussed over the course of many years. The underlying technologies of robotics and 3D printing have been circulated and embraced by the general public. Their applications, benefits, and problems of the past, as well as their potential for future applications of such technologies, generate a substantial amount of dialogue.

However, this pattern is not consistent among all of the tech trends. Exactly half of the topics (i.e., 2, 4, 5, 8, & 9) fall far below the average of approximately 22,000 tweets. For example, Trend 8 - The Bio Revolution, has not been discussed to a large degree on Twitter's public forum. This is evident as the underlying topics of Bio Revolution/Biocomputing and Bioengineering do not generate much discussion, and on average, generate only 10,313 tweets. This comes out to an average of approximately 8 tweets on each topic per day. Such a limited discussion on the web is likely due to a variety of reasons: bioengineering concepts may not be employed by a substantial number of users, bioengineering may not be a topic of interest for the majority of companies and individuals, the future applications of bioengineering may not yet be obvious or compelling, and there is likely very little news coverage of the topic being circulated. Although this metric may indicate the degree to which the conversation surrounding each trend is perpetuated, it does not predict its future potential to shape society or how the public feels about each topic. Sentiment analysis may be uniquely positioned to help achieve this purpose.

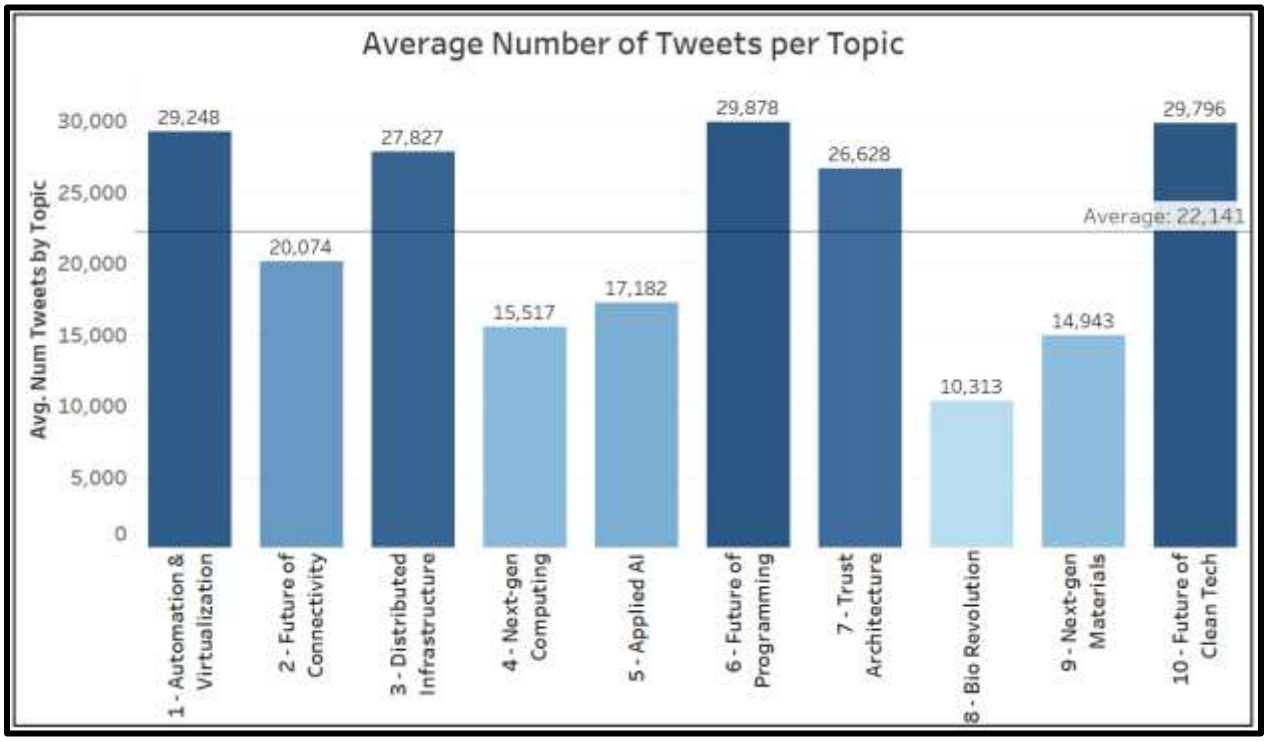

Figure 2: Average number of tweets for each topic within each of the ten trends

Upon aggregating the composite sentiment scores for all of the tweets associated with each trend, it becomes evident that each score has a slightly positive sentiment score. With a possible range of -1 (very negative) to 1 (very positive), this pattern is apparent in the overall average score of 0.26 (see *Figure 3*). This suggests that generally, the public is subtly optimistic about the technologies behind each of the top ten technology trends. The perceived level of subtle optimism is fairly consistent across all of the trends (with the exception of two) which is exhibited in a range of sentiment scores varying from 0.19 to 0.27. The two exceptions are Trend 7 - Trust Architecture, at 0.35, and Trend 10 - Future of Clean Tech, at 0.41. Both of these tech trends exhibit heightened levels of positive sentiment not currently present among the other trends. Such a difference suggests that in the public's view, the discussion surrounding both trust

architecture and clean technology is noticeably constructive, hopeful, and efficacious. While the other 8 trends are also somewhat positive, the degree of that optimism is not as robust, suggesting that individual experiences with the underlying technologies are more varied and volatile.

To assess if there is a relationship between the number of tweets and the average sentiment score for each trend, a regression analysis was performed. With a correlation coefficient of 0.39, the analysis showed that there is a positive relationship between the two metrics, however it is a weak one. The resulting p-value was 0.246, thus concluding that the correlation between the two variables is not statistically significant.

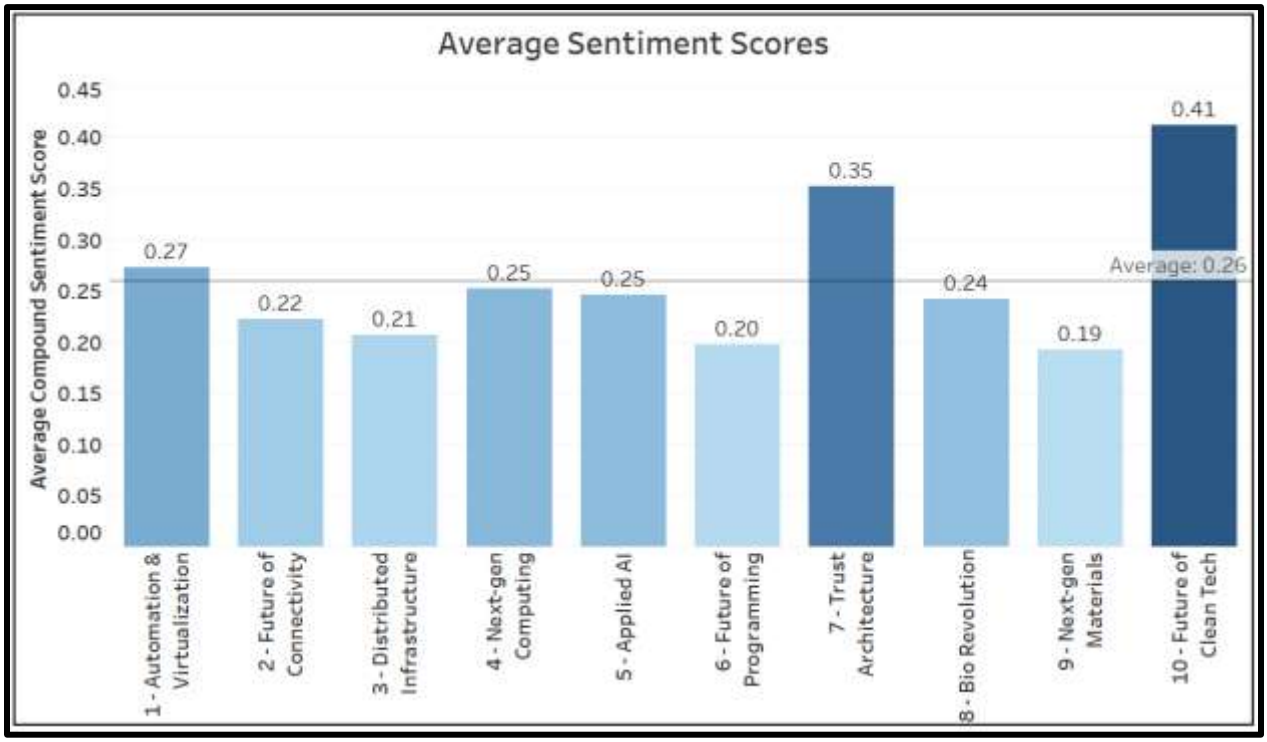

Figure 3: Average sentiment score for each tech trend

While evaluating the overall sentiment for each trend is insightful, further patterns can be discerned by observing the fluctuations in sentiment over time. *Figure 4* provides a clear visualization of these patterns over time for the four most volatile trends—Trend 2 at +0.05, Trend 8 at -0.07, Trend 7 at +0.23, and Trend 10 at +0.05. These differences show that the aggregated sentiment surrounding the individual tech trends may change over time with both positive and negative effects. For example, Trend 8 - the Bio Revolution has seen a slight reduction in positive sentiment since the beginning of 2019. Although a difference of -0.07 is minute, the overall change is significant as it may reflect a diminished sense of trust, disillusionment with the underlying technologies, or a sense of confusion associated with the topic. Contrastingly, Trend 7 - Trust Architecture, reflects a significant jump in sentiment score from 0.27 in 2019 to 0.50 in June of 2022. This change can be attributed to increases in sentiment associated with the underlying technologies, namely blockchain and applications of cybersecurity. As user perceptions of blockchain evolve over time, it's evident that blockchain

and cybersecurity concepts are becoming increasingly celebrated, understood, and most likely also leveraged.

The remaining 6 trends not included in *Figure 4* show very little variation over time, averaging less than 0.02 in sentiment score divergence over the 3.5-year period. This level of consistency suggests that many of the technologies underlying the trends are not very volatile in terms of their acceptance and public perception. This is not surprising as many of such technologies, such as machine learning, robotics, and 3D printing, despite being transformative, are not novel, and as a result the sentiment towards them have not significantly changed over time.

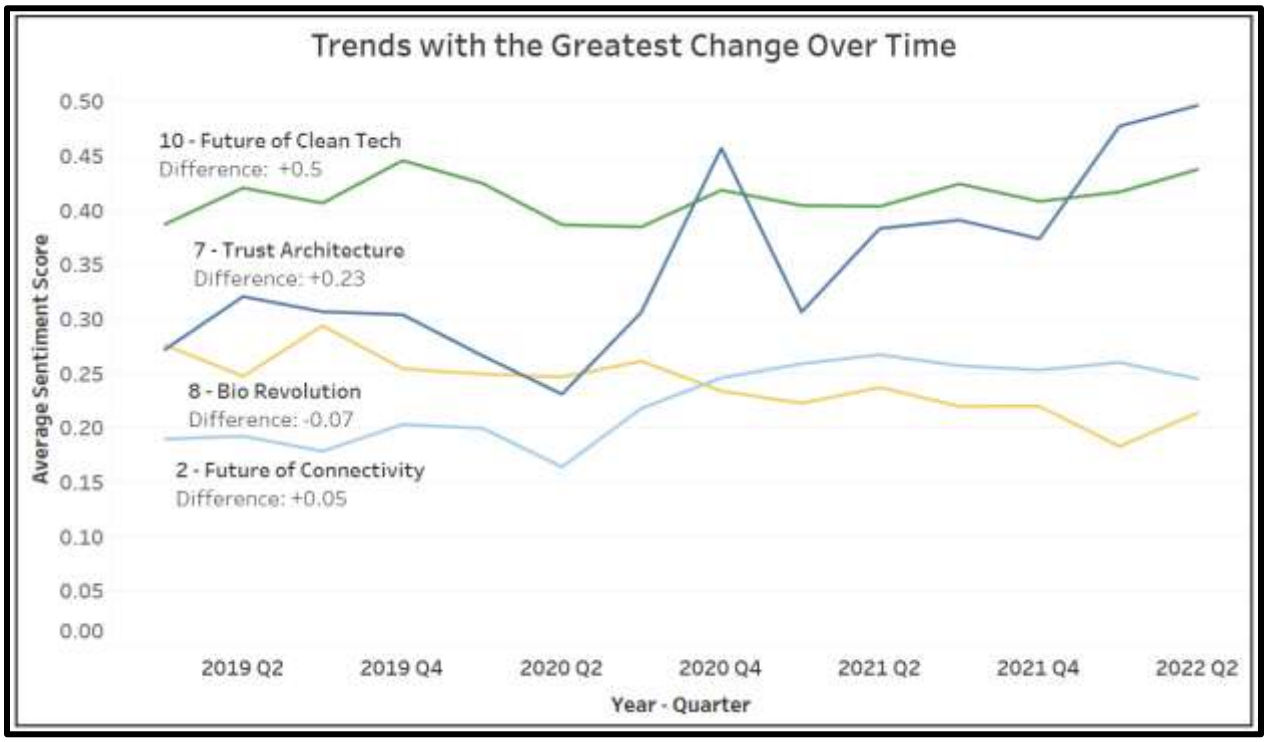

Figure 4: Top four trends with the greatest change in sentiment score over time

DISCUSSION

The intent of this study was to leverage a sentiment analysis tool to evaluate the general attitude of the ten most transformative trends in technology. This strategy allowed key patterns to be made more evident, thereby providing unique insights into the public sphere and a more holistic view of each of the trends and their underlying technologies. From this analysis it is evident that several of the trends, and the sentiment surrounding them, not only differ from one another, but also change over time. Such observations suggest that the sentiment towards individual tech trends are dependent on a variety of external factors. Future research efforts may choose to integrate a variety of data sources and focus on investigating the reasons behind why different trends and the associated technologies differ in the context of social media post sentiment.

There are several significant findings from the analysis that are worth noting. First, not all trends generate the same amount of discussion online. This is evident by the disparity between the

various trends (see *Figure 2*). Five of the topics that fall above the average of about 22,000 posts are widely discussed on a daily basis. This suggests that these tech trends are already well underway to transforming society to various extents in their respective spheres of influence. Their roles in industry are likely to continue to expand as individual users, organizations, and educators leverage existing documentation and precedent to better understand and apply the underlying technologies in new and transformative ways.

However, this does not necessarily mean that the remaining five trends that have historically failed to gain traction on online forums are not yet transformative. It is likely, however, that such trends and their underlying technologies are not yet widely viewed as playing major roles in their respective industries, or perhaps are simply not yet interesting enough to users and companies to generate substantial traction online. It can be expected that in the coming years, trends 2, 4, 5, 8, and 9 will steadily grow in popularity as their roles and applications proliferate beyond their current state.

Second, there does not appear to be a statistically significant relationship between the quantity of posts on a certain topic and the average sentiment score (corr: 0.393, p-value: 0.24). This is unsurprising; however, it is meaningful because sentiment of posts may prove to be a more significant indicator of future adoption and application than quantity of posts.

Third, the average composite sentiment scores paint a distinctive image of the tech trends. Only Trend 7 - Trust Architecture (0.35) and Trend 10 - The Future of Clean Tech (0.41) have average sentiment scores above 0.3 (see *Figure 3*). Such a finding suggests that these two trends are the only trends out of the ten that have consistently been discussed on Twitter in a remarkably positive light. As the public continues to view these two trends in such a way, it can be expected that the trends will continue to gain traction and build upon previous positive sentiment to fuel future transformative technological solutions.

The remaining eight tech trends, which all fall within a 0.08-point range of 0.19-0.27 all also have generally positive sentiment scores, however the strength of those scores is not as pronounced. This is to be expected as tech trends such as these with vast amounts of potential are still being explored, critiqued, and evaluated. Such exploration often results in negative experiences at both the individual and corporate level. But such a struggle does not necessarily negate the future potential that the underlying technologies of those eight trends have to transform the modern technological landscape.

Lastly, by observing the composite sentiment for the trends over time, organizations, researchers, and educators can more clearly observe the trajectory of the tech trends (see *Figure 4*). Understanding how the technologies have historically been perceived, and comparing that to how they are perceived now, provides us with an increased understanding of where the trends may be headed in the future. While sentiment towards Trend 7 - Trust Architecture, has over time become increasingly positive over the 3.5-year period, sentiment toward Trend 8 - The Bio Revolution, has slowly regressed. While this paper does not attempt to predict how future trends will play out long-term, these findings may inform which trends to carefully observe in the future, when to enter respective markets, and what concepts and technologies may be worthwhile to teach at universities and other technical programs.

CONCLUSION

This study contributes to our understanding of the contemporary technological landscape by revealing the sentiment surrounding the ten most prominent and transformational technology trends. Industry leaders may look to these findings to inform investment and innovation decisions. Individuals may benefit as they look to establish their careers in promising industries associated with a high level of positive sentiment. Additionally, these findings may help apprise educators and their institutions with novel perceptions of the future of work as they look to equip students with marketable skills that will help catalyze further innovation associated with the trends and their underlying technologies.

Opportunities for further research in this domain may include pairing the data available from Twitter with data from one or more other data sources, including financial services, patent filings, corporate investments, Google search trends, and other social media platforms. While this study is limited to the patterns revealed from performing sentiment analysis on Twitter posts, the inclusion of multiple data sources would help provide a more holistic view of the marketplace and foster increased understanding of how these core technology trends have been perceived, how they are currently understood and employed, and to what extent such technologies will play a transformative role in the future.

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CRISIS AS A CATALYST: ENABLING DIGITAL TRANSFORMATION USING LOW-CODE AND SAAS TECHNOLOGIES

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ABSTRACT

In the face of unexpected challenges such as a global pandemic, political unrest, climate change, and other economic shocks, organizations without established IT infrastructure may look to use low-code development (LCD) and Software as a Service (SaaS) to allow for flexibility and speed when facilitating a digital transformation. The large-scale pivot of employee wellness company, Nivati, provides a thorough case study into how service organizations can quickly and effectively leverage LCD and SaaS to pivot their business model and service offerings to persist in the midst of crisis.

INTRODUCTION

Operational crises are an unfortunate reality for organizations around the world. Knowing how to effectively pivot business models and the associated technology stacks to respond to such disruptions is often ambiguous and unprecedented. Considering the case of the ongoing COVID-19 pandemic, minimizing face-to-face interactions has been a necessity. This unprecedented restriction has had significant impacts on a variety of industries that rely heavily on in-person interaction, including healthcare, personal and legal services, and education. While some organizations have failed to adapt their business models to successfully implement the required digital transformation, others have embraced the opportunity this and other crises present and leveraged simple technologies such as LCD and SaaS to rapidly transform their workforce and service offerings.

LCD and SaaS

LCD provides a graphical user interface for users to drag and drop with little or even no code. The equipment of out-of-the-box units (e.g APIs and components) in LCD platforms speed up development and are easy to learn and use (Luo, Liang, Wang, Shahin, & Zhan, 2021). Additionally, the integration of internet-based SaaS helps organizations avoid capital expenditure and pays for the functionality as a comparatively inexpensive operational expenditure (Godse & Mulik, 2009). Because of the general simplicity, speed of learning, availability, and lower capital costs of such technologies, employing LCD and SaaS can help organizations flexibly adapt to digitally transformed business models.

Nivati as a Case Study

The large-scale pivot of employee wellness company, Nivati, provides a thorough case study into how service organizations can quickly and effectively leverage LCD and SaaS to pivot their business model and service offerings to persist in the midst of crisis.

OVERVIEW OF THE ORGANIZATION PRIOR TO THE CRISIS

Prior to the advent of the COVID-19 pandemic, Nivati was known as Zenovate—a company that contracted with corporations to provide on-site massages as a wellness offering for employees. Zenovate employed over 1,000 massage therapists in addition to 40 other employees. Of all sales, 99% came from in-person massage services. Zenovate was on track for $10 million in revenue for the year 2019. At the time, the organization's primary technology stack consisted of a custom .NET application used for scheduling, which was in the process of being integrated with Salesforce. When the pandemic hit the US in early 2020, Zenovate's business was halted indefinitely with sales dropping below sustainable levels. The COVID-19 pandemic proved to be a catalyst for technological change within the organization.

THE DIGITAL TRANSFORMATION

Faced with outstanding contracts to various corporations and no way to fulfill them, Zenovate was forced to adapt. After rebranding to Nivati and embracing a vision as a comprehensive digital wellness company, Nivati approached various clients and investigated what services they could provide. In July 2020, Nivati began offering live and on-demand sessions of massage instruction through Zoom and Vimeo respectively. These SaaS products were employed by Nivati to serve as a simple and financially feasible solution to continue providing their services. Nivati approached their massage therapists and inquired what alternative offerings they could provide. The inquiry resulted in Nivati hiring their massage therapists into roles as certified yoga instructors, nutritionists, and life coaches. As the company's pivot from an in-person service organization to a digital wellness company ensued, the company quickly began offering those services live and pre-recorded. Using Salesforce as a low-code platform to manage customer relations and host their emerging website, Nivati posted the videos, regularly making changes and updates.

After further discussion with the growing client base about their wellness needs, in October 2020, Zenovate began offering live counseling services. Counseling services quickly became the most popular aspect of the business. This discovery led Zenovate to hire more certified counselors and expand the scope of their virtual offerings to incorporate two mobile applications, advanced scheduling software, database and backend support, and gamification, all built using LCD and SaaS. In a period of a little over six months (March to October 2020), Nivati navigated the COVID-19 crisis and underwent a company-altering digital transformation.

The 4 Steps of Digital Transformation

To facilitate the company's digital transformation using LCD and SaaS, Nivati underwent the following steps:

1. Assess service offerings and capabilities

- Communicate with clients to know what they would accept as a virtual delivery.
- Communicate with employees to assess varying skill sets and willingness to adapt to new roles.

2. Build out the prototype
    - Embrace proposed solutions and test their effectiveness.
3. Refine through further discovery
    - Deliver the services and further develop them based on interactions with customers.
4. Improve the systems and technology stack
    - Allow the tech stack to evolve with the organization's pivot.

These four steps constitute a process that allowed Nivati to rapidly pivot their business model and implement a digital transformation. This model was effective for Nivati as a small, service-based organization, but may be applied in strategic and crisis-driven contexts for a variety of organization structures.

Benefits of Digital Transformation Using Low-code and SaaS Technologies

Having a technology stack based on LCD and Saas proved to be key in Nivati surviving as a newly transformed digital company with virtual offerings. This digitization provides a variety of benefits: 1) Nivati's new business model is no longer limited by geography but instead has a global reach; this increases the number of potential clients in their market. 2) The company's multiplier valuation is more than 5x what it previously was as it is now considered a technology company. 3) Nivati's tech stack—based on LCD and SaaS—can flexibly respond to internal changes, technology advances, and industry shocks.

Figure 1 visualizes the responses of a survey conducted from April 15, 2020 to May 15, 2020 by BetterCloud, a platform that manages and secures SaaS environments. The survey gathered data from IT professionals who employ SaaS technologies in their organizations. The chart exhibits the motivations of those IT professionals for employing SaaS solutions. The most notable motivations are increasing productivity (54%) and reducing costs (35%). Thus, organizations who are also seeking to effectuate a digital transformation may experience additional benefits from adopting SaaS offerings.

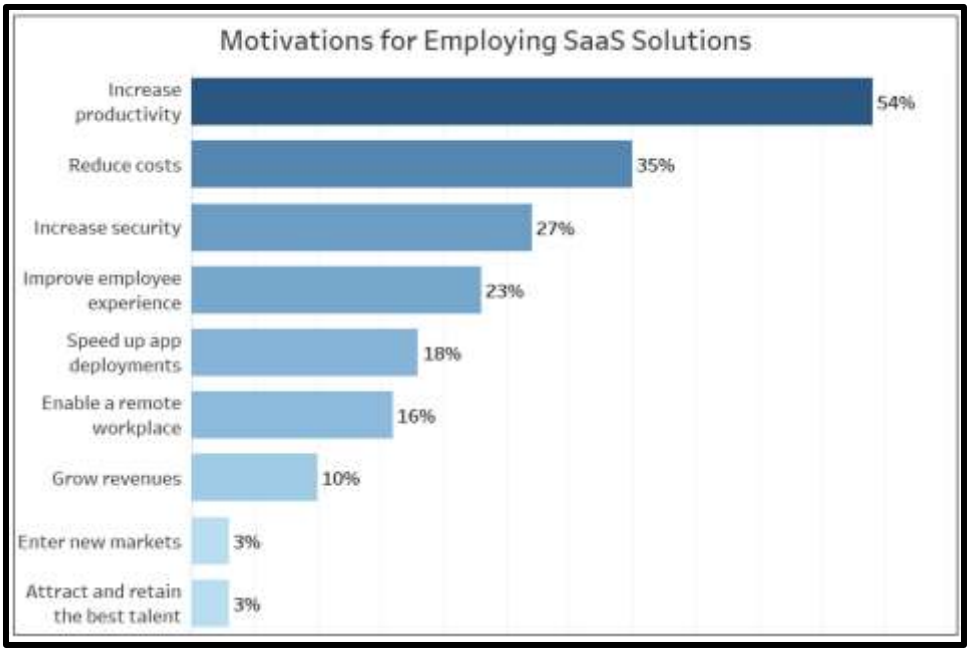

Figure 1: Motivations of IT professionals for employing SaaS solutions in their organization (adapted from BetterCloud, 2020)

Nivati Going Forward

Currently, 80% of Nivati's revenue comes from its counseling services with an additional 15% from its video library. With the effects of the ongoing pandemic still present, Nivati is unable to return to its previous, massage therapy-based business model, but has expectations to eventually recapture much of the business it had prior to the crisis. While the transition back to normalcy will eventually be possible, Nivati is now positioned to continue perpetuating the success of their digitally transformed employee-wellness organization that is growing at 100% annually.

CONCLUSION

The Nivati case study shows that service organizations can successfully facilitate a digital transformation in the face of crisis, in part, by utilizing software as a service and low code development. The simple, inexpensive, and easily mutable nature of SaaS and LCD allows companies to rapidly respond to crisis or strategic organizational change and adapt their offerings to provide value in a digital market.

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CRISIS-DRIVEN DIGITAL TRANSFORMATION: LEVERAGING CLOUD-BASED CONTACT CENTER AS A SERVICE TECHNOLOGIES

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ABSTRACT

This short, case-based paper outlines the digital transformation of Coast Capital, a credit union with various financial service offerings, and how it changed from a premises-based system to a cloud-based model with expanded service offerings and national reach. We highlight how the COVID-19 pandemic served as a catalyst for such a transformation, and how Coast Capital leveraged a cloud-based contact center as a service (CCaaS) solution to modernize and improve the structural flexibility of their workplace and enterprise.

INTRODUCTION

In March of 2019, due to government regulations associated with the COVID-19 pandemic, many workplaces categorized as non-essential were required to enforce social-distancing and minimize in-person interactions. These regulations posed a significant threat to both the functionality and profitability of many organizations. One of these organizations was Coast Capital, a provincial credit union in southwest Canada that provides financial services such as banking, investments, insurance, and lending to its customers in British Columbia. Threatened with insolvency due to its inability to effectively communicate with and serve its clients, Coast Capital decided to enact a partial digital transformation by adopting Contact Center as a Service (CCaaS) technology and going remote. This move ultimately allowed Coast Capital to not only weather the pandemic but also prime the organization for future growth, prepare against other potential crises, and improve their service offerings.

CCaaS

CCaaS is a cloud-based software application where contact centers are hosted and managed. CCaaS providers enable customer service organizations to serve customers across the four pillars of great customer service. They also offer valuable application integrations and facilitate platform standardization across an organization (Critical Capabilities, 2022; Gartner). Using contact center technology, agents can access the full context of customers and use multiple contact methods like phone calls, text messaging, email, and social media (DiNardi, 2021). Additionally, by nature as a software as a service solution (SaaS), CCaaS technology requires fewer in-house IT resources while providing quick scalability and location flexibility. The global CCaaS market is projected to grow from $4.87 billion in 2022 to $15.07 billion by 2029, reflecting the rise in cloud-based service and software adoption for the global remote working population (Contact Center, 2022). In the face of COVID-19 and other crises, cloud contact center technology can help organizations adapt and thrive.

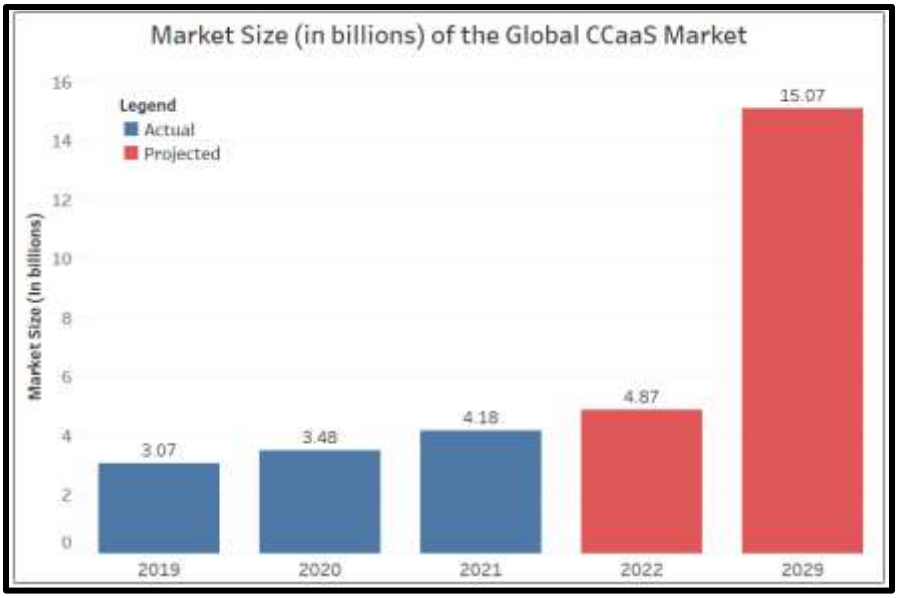

Figure 1: The market size—both historical and projected—of the global CCaaS market (adapted from data provided by *InterVision* and *Fortune Business Insights*). Reflects a CAGR of 17.5o% during the forecast period.

Coast Capital in the Crisis

The financial sector has historically consisted primarily of brick and mortar establishments. Relatively recent technology innovations, and the even more recent pandemic, are driving banking companies to adapt and innovate to increasingly digital solutions. Coast Capital is among many of the companies whose service offerings were significantly impacted by COVID-19.

Coast Capital began as a local, provincial credit union in southwest Canada, providing financial services such as banking, investments, insurance, and lending to its customers in British Columbia. In 2018 Coast Capital obtained a national banking license which allowed them to expand its market reach. At the time, Coast Capital's technology was failing to deliver what Coast Capital needed to provide to its newly expanded, geographically distanced market. The legacy systems and technology they employed weren't flexible or reliable enough to consistently meet the needs of their clients. Additionally, many of Coast Capital's physical facilities were located near a fault line, putting much of their data (which was stored on premise) at significant risk. It became clear that a change from premise-based technology to cloud-based technology would be paramount to meet the organization's needs.

In early 2019, Coast Capital selected a CCaaS vendor, built out their solution, and had just launched the first iteration of the new technology when the initial regulations associated with COVID-19 were enacted. Coast Capital's Public Health Officer released a statement limiting the organization to no more than 50 people in one physical location, or on one floor. With a total of 165 employees working at the call center, following this guideline proved to be difficult. Prior to moving the entirety of their workforce to remote work, Coast Capital distributed their workforce to seven different locations. With their recently launched CCaaS solution, Coast Capital was able to track and support employees, while also meeting the safety requirements of British Columbia.

In addition to the regulatory challenges stemming from the pandemic, Coast Capital's call volume increased by 158% due to customer calls for COVID-related payment deferrals and government support programs. With their current infrastructure, Coast Capital was unable to handle the volume of calls they were receiving. In addition to the increasing volume, the calls were also reportedly more emotionally charged. This ultimately led to quicker burnout and high levels of turnover for Coast Capital's employees. To meet the demand, Coast Capital expanded their workforce by 25%, set up online, self-serve forums, and hired stand alone groups to handle the forums. The training of the 85 new employees was facilitated using the CCaaS technology.

Ultimately, after experiencing several iterations of the CCaaS technology, Coast Capital found a solution that helped solve many of the issues associated with its distanced financial and customer services. Due to the rapid digital transformation of their call center, Coast Capital was able to more effectively handle the increased call volume, help customers regardless of their geographic location, and remotely train employees.

TECHNOLOGY IMPLEMENTATION

Using a three-step process, Coast Capital was able to facilitate a smooth transition from on-premises to remote work. Coast Capital's effective implementation of the CCaaS solution consisted of three key phases:

1. Analyze CCaaS vendor alternatives
2. Build and iterate the technological solution
3. Implement the solution and train employees.

Analyze Alternatives

The first step for Coast Capital was analyzing the costs and benefits of a CCaaS model. Once they made the shift to offering banking nationally, Coast Capital's in-house technology no longer met the needs of their geographically diverse client base. When the pandemic hit, it became necessary for Coast Capital to have the capability to move their workforce to remote work. After deciding to transform their technology to implement a CCaaS solution, Coast Capital assessed possible vendors.

Coast Capital sought out a CCaaS vendor that provided flexible and scalable technology, but would also be ambitious about the future and committed to the partnership between the two companies. To make this decision Coast Capital held meetings with cross-functional groups to discuss requirements, reviewed the Gartner Magic Quadrant for CCaaS vendors and interviewed many of the CCaaS vendors listed by Gartner. Coast Capital ultimately chose to work with NICE CXone's CCaaS platform which provided the features, security, and flexibility Coast Capital was looking for.

Craft the Solution

In addition to identifying criteria for vendors, Coast Capital expanded the criteria for their software solution to more effectively fit their unique situation. Throughout 2019, Coast Capital worked closely with Nice CXone to explore software options and identify what solution would best fit Coast Capital's needs. Once the solution had been planned and crafted, Coast Capital migrated their data to their new cloud contact center application and ran tests to ensure the data

migration was successful and the solution was working properly. At the end of November 2019 Coast Capital launched their new solution.

Implement Solution & Train Users

Coast Capital spent the next months exploring the capabilities their new solution offered. With a new system and the challenges associated with the pandemic, a Coast Capital employee described the situation, "We [felt like we] were still driving our toy car around the parking lot." As COVID-19 became an increasing issue for service-oriented businesses, paired with strict government regulations, Coast Capital had to quickly learn their new system. Trying to ensure employee safety and keep the business operational meant moving to a remote model much more quickly than Coast Capital was expecting. In February 2020, Coast Capital reportedly didn't believe they would have the capability to successfully implement a remote model. Following implementation of the new system technical issues quickly arose, but a team of Coast Capital employees and CXone consultants worked to solve the networking issues. Eight days of trial and error after putting the system online, a feasible solution was found. Coast Capital then distributed their workforce. The transition to remote work took about thirteen days.

In addition to implementing an effective solution, one of Coast Capital's foremost priorities was providing support to employees and to help them feel connected in the new, distanced system. Using training provided by the SaaS vendor, Coast Capital was able to educate their employees on the new software and help them feel engaged, informed, and competent while working in a remote environment. This training proved to be crucial as Coast Capital operated in a remote environment for the remainder of the year, with much of their workforce still working remotely. Thus, the CCaaS infrastructure and employee training enabled Coast Capital to effectively transform its business to perpetually operate outside the physical bounds of their offices and provide their services to distanced clients as they were distanced themselves.

CONCLUSION

Following the three-step process allowed Coast Capital to effectively implement cloud contact management technology and adapt to the issues derived from the pandemic. The organization successfully conducted the transition of 165 full-time employees from in-office to remote work, reduced employee absenteeism to less than two percent, and maintained its customer support and satisfaction despite the crisis. This case presents a pattern that other organizations may follow when enacting a digital transformation.

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THE MOS CERTIFICATION EXAM—A HISTORICAL PERSPECTIVE WITH A LOOK TO THE FUTURE

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ABSTRACT

With the increased demands from industry for students to have credentials in software packages such as Word and Excel, this study looked at the pass rate of the students and looked at the scores on the Word 2019 associate exam. The study suggests questions such as: Is our Introduction to Computer Applications course experiencing a successful pass rate? What has been the trend of pass rates since 2019? and what, if any, changes might be required to the course once this data is reviewed? This study proposed a look at some of the historical data collected about those scores. Specifically, the school terms of 2019-2020, 2020-2021, 2021-2022 were analyzed, recorded, and described.

Keywords: *Microsoft Certification, MOS, Word Associate, MOS Word Expert*

INTRODUCTION

> *Students who earn MOS certifications have been shown to* ***earn higher GPAs, graduate at a higher rate, and get higher-paying jobs****. The Microsoft Office Specialist Program also helps educational institutions raise the bar on their performance* (Microsoft Office Specialist Program--Success Stories, 2022)

Business and industry have made certification an important qualification for employment, where often an employee is required to have a certification at the time of hire, or employees must obtain certification upon hire (Schlichting & Mason, 2004). IT hiring managers have used certification as a differentiator between job candidates with similar levels of experience, and salary surveys have shown that certified employees are compensated at a higher salary than non-certified employees are compensated (Hunsinger & Smith, 2008).

A need exists for certified Information Technology professionals in the workplace. As the university prepares students for employment in areas requiring certifications for employment, it is increasingly important for those educational institutes to provide adequate and effective training through the course work offered.

As employers have expressed, a certification brings benefits to School of Business graduates. Industry partners have expressed interest in certifications, including the Microsoft Word certification, for graduates of the business program. The BUAD 1800 – Introduction to Computer Applications course is the first certification class taken by students in the program. These students currently take the Word 2019 Associate exam only in this course.

PROBLEM

Our university has been giving the Microsoft Office Specialist exam in Word as a required final exam for the Introduction to Computer Applications (BUAD 1800) course since 2015. Though passing the exam was not mandatory, taking the exam was. This class was specifically designed to prepare students for the MOS Associate Word 2019 certification exam. Records have been kept of students' attempts and scores since that time. This study proposed a look at some of the historical data collected about those scores. Specifically, the school terms of 2019-2020, 2020-2021, 2021-2022 were analyzed.

With the increased demands from industry for our students to have credentials in software packages such as Word and Excel, this study looked at the pass rate of the students and looked at the scores on the Word 2019 associate exam. We were seeking to determine if there is a need to strengthen the requirements for the course and amend the curriculum to allow for the opportunity for students to achieve both the Associate Word certification and the Word Expert Certification in this one course or add a second course. The study suggests questions such as: Is our Introduction to Computer Applications course experiencing a successful pass rate? What has been the trend of pass rates since 2019? and what, if any, changes might be required to the course once this data is reviewed?

The purpose of this study was to try to answer these and other related questions by reviewing the historical data related to MOS Word scores from both face-to-face and online sections for the semesters during the 2019-2020, 2020-2021, 2021-2022 terms (six semesters).

Objectives of the study were: (1) to gather and report information about the students' scores on the MOS Word 2019 exams, and (2) to prepare a graphic showing any trends, and finally, (3) to determine if the faculty should continue teaching the course as is or, if a possible change of curriculum might be required in the future.

Population

The population for the study was a sample of students enrolled during the 2019-2020, 2020-2021, 2021-2022 terms (six semesters) in twenty-five sections of Introduction to Computer Applications (BUAD 1800) courses offered in the College of Business and Technology at a small regionally accredited four-year university in Louisiana. This course is a required core course for the Business Administration curriculum. The twenty-five sections used for this study were taught by multiple instructors in both online and face-to-face settings. The students take this course during their first semester of college.

METHODOLOGY AND DATA ANALYSIS

In this exploratory study, the data was collected by the instructors of the twenty-five sections of the course. Students' scores were a part of the historical data kept for each of the sections. Records were studied, recorded, and analyzed from this historical data. The study was completed during the spring 2023 semester and the preliminary results will be presented at the annual Association of Business Information Systems (ABIS) conference in Houston, Texas.

Some demographic data will also be collected. The scores were downloaded into an Excel spreadsheet for analysis. For this exploratory study, the findings will be reported using descriptive statistics in the form of tables. Some demographic data will also be reported.

Implications for Education

Once all the data is reviewed, instructors and university personnel will determine if the course should remain as is, become more rigorous to allow for both the associate and expert Word exams in one course, or if a second course should be developed for an additional certification in Word Expert. Recommendations will be made at the end of the 2023 semester.

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A full list of references will be provided upon request.

MICROSOFT OFFICE GOODIES: NEW FEATURES TO HELP BUSINESS STUDENTS AND PROFESSIONALS

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ABSTRACT

The use of productivity and automation software, such as Microsoft Office, has changed the business environment and truly made the desktop computer a powerful tool in conducting daily operations. Since their initial introduction, the applications and suites have changed and adapted to the needs of the users and business environment. No longer limited to the standalone desktop, these applications can be accessed and utilized on a variety of mobile devices. This paper will review some of the latest features of Microsoft Office 365 as related to helping business students and professionals with their writing and presentations. Additionally, a few of the helpful productivity tools available in the Microsoft Office Mobile App are discussed, as the App provides Microsoft Office access for those professionals using iPhones, iPads, and Android technology.

Keywords: Microsoft Office, Office 365

INTRODUCTION

While searching for information about the recently released Windows 11 operating system, one of the authors stumbled upon features available when using Microsoft Office 365. Having taught the desktop versions of Microsoft Office for many years, this author was unaware of what could be accomplished using Word, Excel, and PowerPoint available through the Office.com website, Microsoft Office 365 desktop versions, and Microsoft Office Apps for a range of devices. In addition, the Microsoft Office Mobile App has its own set of useful features.

This led the authors to review the features and enhancements of the Microsoft Office Suite throughout the years. In addition to the noted enhancements, the authors sought to find features and tools that would aid business students and business professionals in the current business environment, a global and mobile workforce, where communication and flexibility are both important components of a business professional's success.

LITERATURE REVIEW

The first version of Microsoft Office dates to November 1990 when MS Office 1.0 was introduced (Kumar, 2022). This initial suite included Word 1.1, Excel 2.0, and PowerPoint 2.0. Prior to the introduction of this office suite, the individual programs such as Word and Excel were available for DOS. Kumar's 2022 historical review of Microsoft Office noted that once the initial suite was released in 1990, new versions with updates were released in 1991, 1992, and 1994; this also included new applications such as Publisher. In 1995, Microsoft released Office 7.5 or Office 95; thus, starting the new naming convention to match the year of anticipated release. This version was also not backward compatible and only worked on Windows 95 and later operating systems.

Kumar (2022) noted that in fall of 1996, Office 97 was introduced, along with the office assistant feature named Clippy. Office icons now appeared on the Windows launch bar. In 1999, Office 2000 offered users a better experience with smoother user elements and better security; this was followed by Office XP in 2001. Kumar noted that Office 2003 was the most used office version ever because it blended with Windows XP completely, presenting icons and toolbars with the same look as the operating system. This version remained a favorite until users were forced to update to Office 2007 and 2010. Kumar reported the highlight of Office 2007 was the ribbon bar which provided a comprehensive set of tools among all applications for creating and formatting a document. Office 2010 introduced Office Web Apps which allowed users the same applications on the pc, smartphone, or web browser.

Office 2013 and Office 365 introduced cloud integration and touch capability (Kumar, 2022). Office 365 was initially introduced in 2011 as a replacement to Microsoft's cloud-based business suite. In a short time, Office 365 took over standalone Office versions in colleges and businesses. In addition to web versions of Word, Excel, and PowerPoint, it also includes OneNote, and a mail program. It also offers unlimited storage on OneDrive.

Kumar (2022) reported the enhancements to Office 2016 were primarily to boost usability on mobile devices and touchscreens. Microsoft Office 2019 for desktops included improvements to the three main applications – Word, Excel, and PowerPoint. Users could insert Scalable Vector Graphics (SVG) and prebuilt Images called Icons. They could create objects in Adobe Illustrator and insert them into Word without having to convert them into a pixel image (.jpeg, .gif, .png, etc.). In addition, language translation allowed users to type in English and show it in another language (or vice versa).

Today, Microsoft 365 (formerly Office 365) and Office 2021 are available to users (Kumar, 2022). Microsoft 365 offers users extensive cloud integration, including real-time collaboration on files, moving back to original files, and access to these files from anywhere; storing the files on OneDrive allows users access on most devices with an internet connection. Microsoft Office 2021, the standalone version of the suite, has a new design with a refreshed ribbon interface, rounded window corners, and a neutral color palette. Office 2021 also has new data types, functions, translation, new inking tools and editing tools, motion graphics, and other ease-of-use features.

A 2013 white paper commissioned by Microsoft Corp. and released by the International Data Corporation (IDC) provided insight into the skills students will need for the top 60 high-growth, high-wage occupations. Of the twenty most common skills needed for those positions, Microsoft Office proficiency was second only after oral and written communication and ahead of attention to detail (Microsoft, 2013). With advancements in and dependency on technology since 2013, it is reasonable to believe that Office proficiency is still a highly needed skill in the workforce. According to Global Trade Magazine, "Nowadays, it's impossible to function without productivity tools that help you to run your business, promote your brand, or manage your personal affairs." (Hunter, 2021). This statement suggests students and employees not only need to highlight their proficiency when applying for a job, but to also work to achieve a higher level of proficiency in the various applications.

However, being an expert in the applications, but poor in other skills, such as grammar, writing, or delivery of presentations, might negate the mastery one is capable of with the software. The Society of Human Resource Management's (SHRM) website shares articles for employers and employees about common trends in business and recruitment. SHRM recently interviewed Ian Siegel, the CEO of Zip Recruiter, who stated that "70% of all resumes will be sorted by a computer algorithm before they ever get to a hiring manager." (Doheny, 2020). Resumes with spelling or grammar errors are rejected without human interaction. When a document is poorly written it impacts the credibility of the writer or company; it could come off as laziness and incompetence. Also noted were the differences in grammar usage between generations, with younger workers' writing considered less formal or sloppy, while the older generations are focused on old school grammar rules. Having a tool that proofs writing for spelling, grammar, and punctuation consistency could benefit all generations in the workplace.

Microsoft's 2013 white paper listed oral and written communication skills as the top needed skill in the workplace. Over the years, Microsoft has improved and perfected various tools to help users improve writing skills; however, oral communication is harder to address. The topic of oral communication in business has been studied for years. A 2002 study of workplace needs and uses of business graduate employees found that oral communication activities in the workplace cover a wide area, ranging from formal presentations to participation in teams and meetings, to one-on-one interactions. For students to learn and improve these skills, they need instruction, experience, practice, and critical thinking ability. Being able to practice in different business situations such as with similar status colleagues in the same company department, with supervisors, in meetings, and in teams; as well as interacting with individuals with different cultural, gender, generational, and status group backgrounds can all contribute to a business professional's success (Crosling & Ward, 2002). Practice, especially in a college course setting, offers students feedback on their communication skills and can critique delivery, relatability, and overall effectiveness.

Even the best oral communicator may have had trouble adapting to the virtual business environment that exploded in 2020. With the onset of COVID 19, the opportunities and tools for online meetings, presentations, and one-on-one interactions, have become available at everyone's fingertips. Are business professionals using the same oral presentation skills they used during in-person meetings? How can online students practice and receive feedback in an asynchronous environment?

A June 2021 article in the Financial Post stated, "According to Statistica, Office 365 is used by over a million companies worldwide, with over 731,000 companies in the United States alone using the office suite software. …. In terms of actual users, there are 1.2 billion worldwide." The enhancements Microsoft introduced with each updated version are designed to improve overall productivity of users. The application suite has adapted to the modern business environment and available technologies to provide users with products and tools to stay connected, mobile, efficient, and productive. For Microsoft Office users, learning the new features of each release and version will give them the opportunity to improve their overall capability of product, and allow the various applications to improve the quality of work they produce by correcting grammar errors, helping to improve their communication ability, and allowing for mobility both in location and device utilization.

The authors have researched and tested several of the new features of Microsoft Office 365 that are not available in the standard desktop version of Microsoft Office. While most business programs across the country teach some form of Computer Literacy using the Microsoft Office applications, introducing business students and business professionals to these online tools may provide additional tools that will improve their performance and work created using this software product.

OFFICE 365 – REVIEW OF THE FEATURES

The authors focused on three key features for this paper, including Microsoft Editor, Speaker Coach, and special Mobile App capabilities. The following discussion also includes illustrations to further enhance understanding of the functionality of these features.

Microsoft Editor

The Microsoft Editor is an AI-powered writing assistant. It can also be installed as an extension in the Microsoft Edge and Chrome browsers. "Across social media, email, and documents, Microsoft Editor helps you check your spelling and grammar and polish your writing style. Use Editor in Word, Outlook, Gmail, LinkedIn, and Google docs, among many other places," (Microsoft Corporation, 2022). Also included is a similarity checker which can help users with their writing skills. Citation tools are present giving the users an opportunity to correctly cite their resources.

Figure 1 displays the Home ribbon along with the other ribbon tabs available in Word 365. The literature review from a previous ABIS conference submission was copied and pasted into Word to demonstrate the capabilities of the Editor. The Editor button is notated by the red box. To access the list of suggestions made by the Editor, the user clicks on the "suggestions" button.

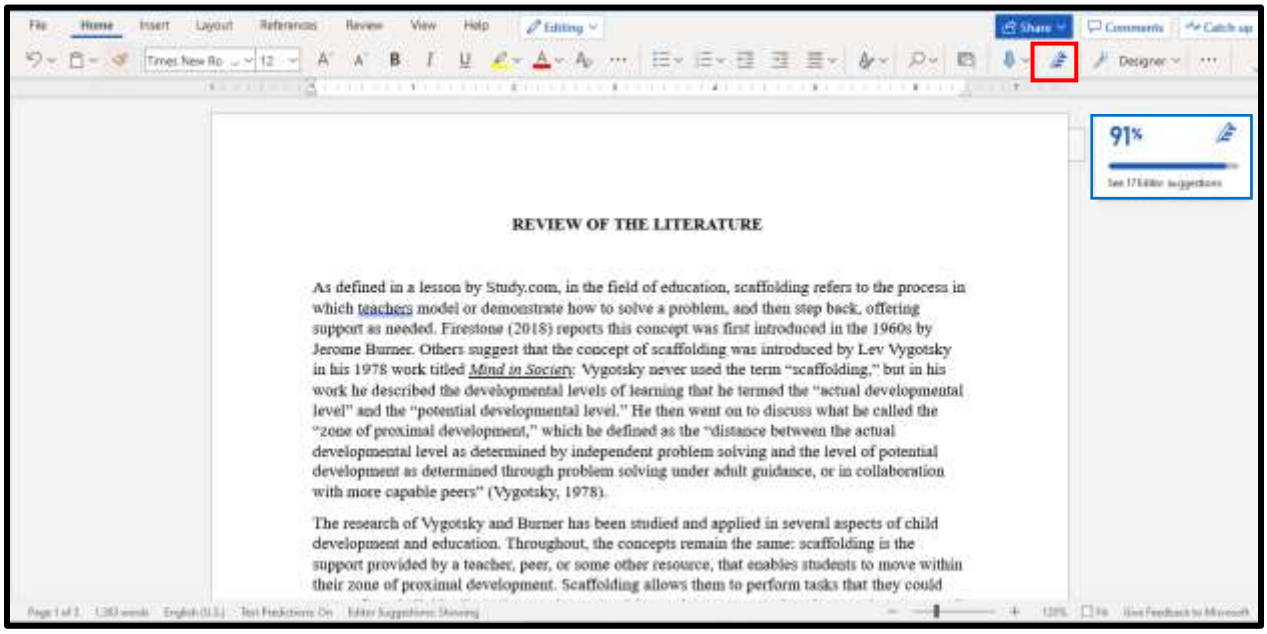


Figure 1. Home Ribbon

Figure 2 displays the listing of the suggestions made by the Editor. If a topic has suggestions that could be applied to the text, a number is displayed. Otherwise, a checkmark is used for "no suggestions."

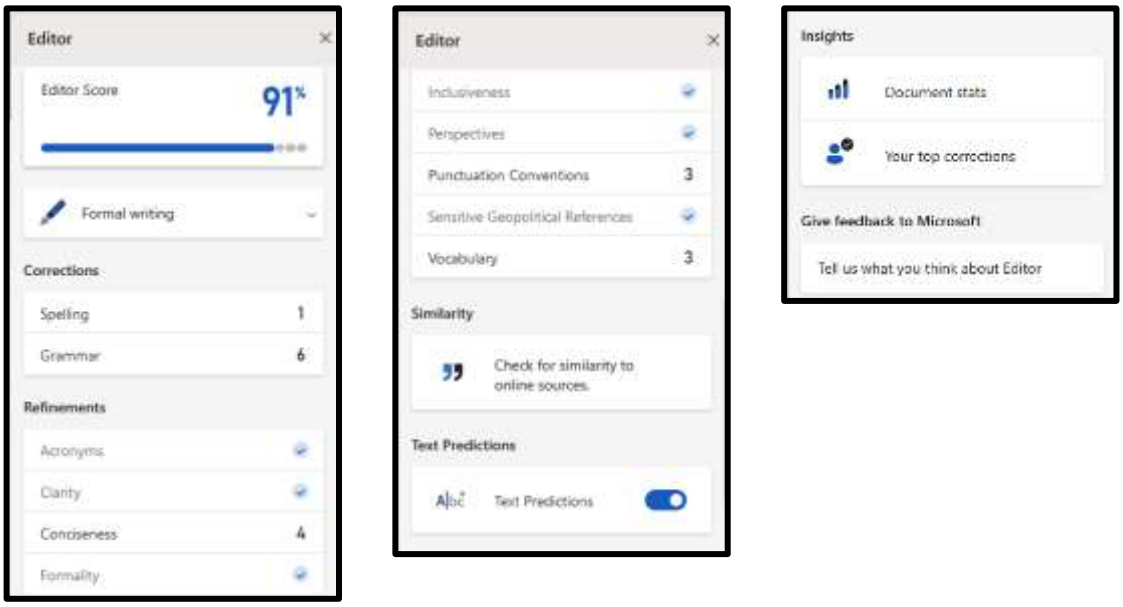
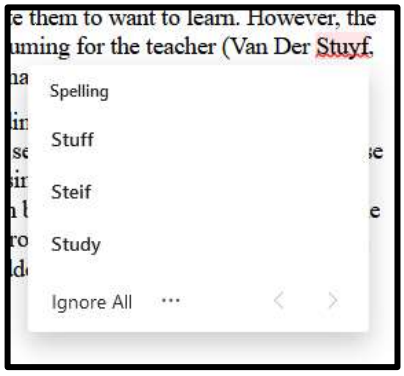
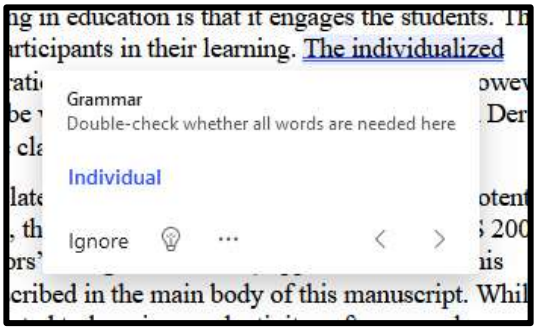


Figure 2. Editor Suggestions

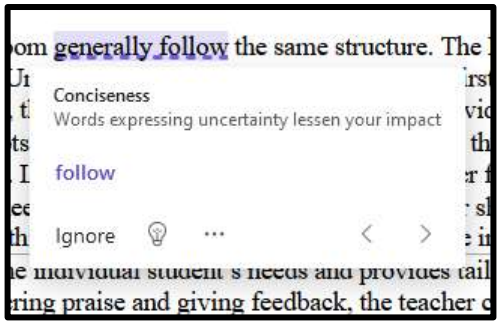
Looking at each of the topic areas where a suggestion was made, one suggestion for spelling correction was given. Six grammar, four conciseness, three punctation conventions, and three vocabulary suggestions were given. An example of each of the suggestions made is shown in figure 3.



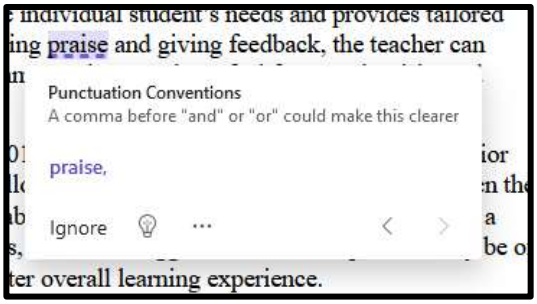
Spelling Suggestions



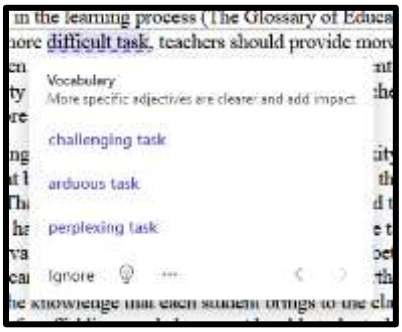
Grammar Suggestions



Conciseness Suggestion



Punctuation Conventions Suggestions



Vocabulary Suggestions

Figure 3. Individual Editor Suggestions

To have the Editor review the text for similarity to online sources, the user must click on the Similarity button, shown in figure 4.

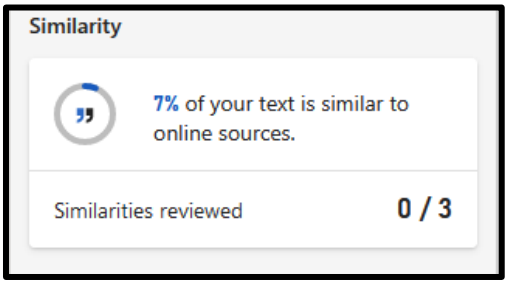


Figure 4. Similarities Reviewed

The first similarity found is depicted in figure 5. The text in question is highlighted and underlined. Possible source of the text found online is given. The user is given different solutions including adding an in-text citation and copying the full citation to the clipboard, using their choice of writing style—APA, MLA, or Chicago. In addition, the user can choose to show the source text, or open the source in the browser by clicking on the ellipses.

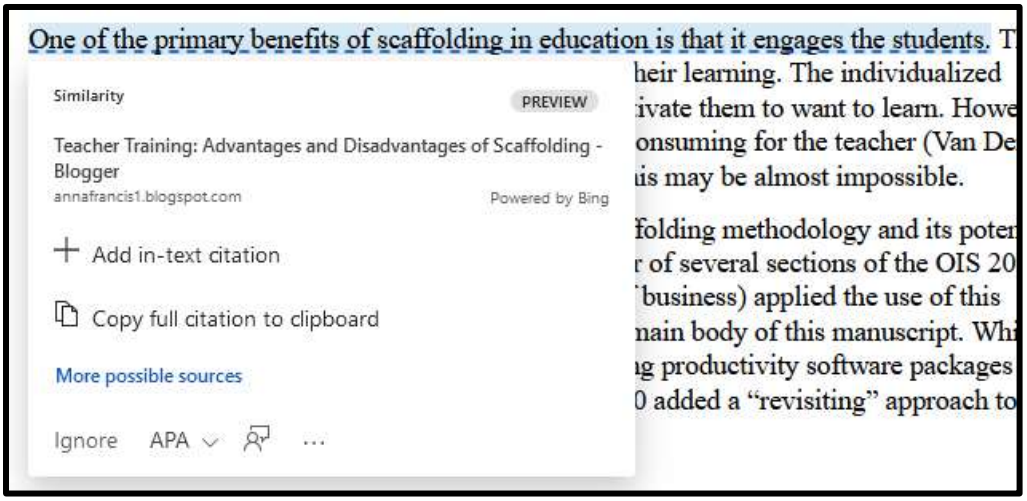


Figure 5. Similarity Suggestion

Clicking on the "Copy full citation to clipboard" produced the following:

> *Teacher Training: Advantages and Disadvantages of Scaffolding - Blogger*. (n.d.). Retrieved from https://annafrancis1.blogspot.com/2011/11/advantages-and-disadvantages-of_29.html

Clicking on the "Add in-text citation" selection instead resulted in the following as shown in figure 6. The text in question has a green underline and is followed by the citation within parentheses.

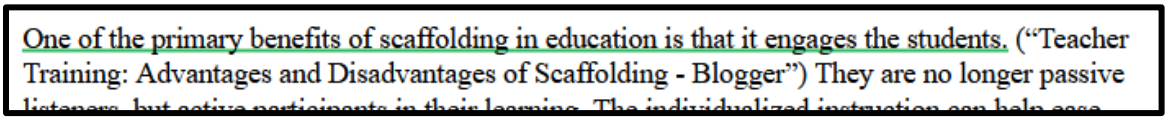


Figure 6. In-text Citation

The document stats from the text analyzed produced the following results as shown in figure 7. Those familiar with readability scores will also note that a Flesch-Kincaid score is provided.

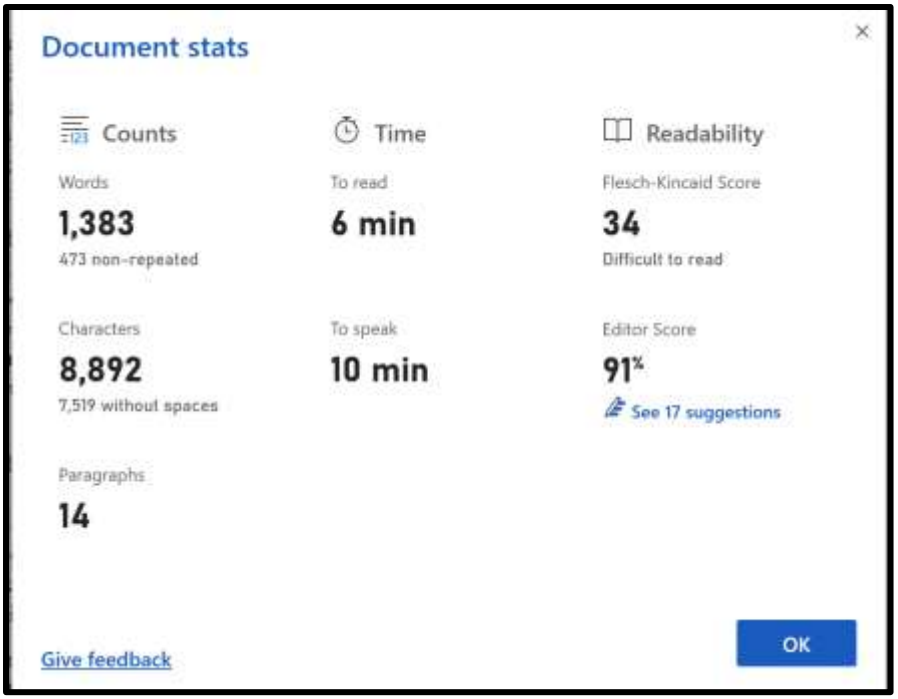


Figure 7. Document Stats

When adding Editor to the Chrome browser, the Editor button is present and a message of "has access to this site" is received when placing a mouse over the button. The button location can be seen in figure 8.

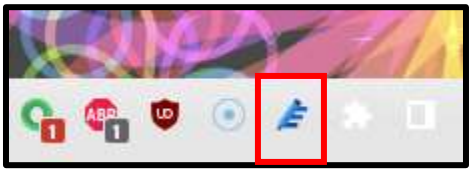


Figure 8. Browser Editor Button

Although an experienced writer may sometimes choose to ignore a Microsoft Editor suggestion (such as electing to keep a passive voice structure in a sentence that has been identified as something to be changed), the Editor offers much assistance in improving the overall quality of a business professional's final written material, whether it be for social media, email, or other documents.

Speaker Coach

Found in PowerPoint, Speaker Coach can help users improve their presentation skills by practicing more effective presentations. Previously known as Presenter Coach, "Speaker Coach evaluates your pacing, pitch, your use of filler words, informal speech, euphemisms, and culturally sensitive terms, and it detects when you're being overly wordy or are simply reading the text on a slide," (Microsoft Corporation, 2022).

Located on the Slide Show tab (see figure 9), the Speaker Coach is an excellent tool for students needing practice for an important presentation. In fact, anyone wanting to polish their presentation skills could use the Speaker Coach.

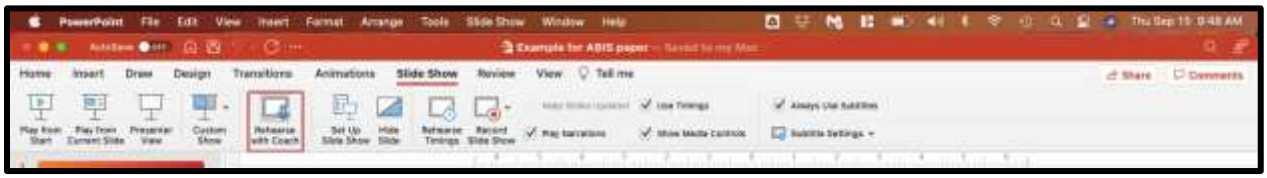


Figure 9. Location of Speaker Coach

Figure 10 displays the comments concerning the presenter's words during a rehearsal.

Figure 10. Speaker Coach Comments

If the user is working with PowerPoint online, an additional feature of body language analysis is available. This can be a valuable tool for presenters, as "Your mannerisms, posture, eye contact, distance from the camera, lighting, and dress can affect the delivery of your message," (Microsoft Corporation, 2022). Observations are presented to the user during rehearsal. To turn on body language analysis, the user selects the box on the menu as shown in figure 11.

Figure 11. Body Language Analysis

Upon completion of the rehearsal, a rehearsal report is received analyzing the presenter's actions. This report is depicted in figure 12.

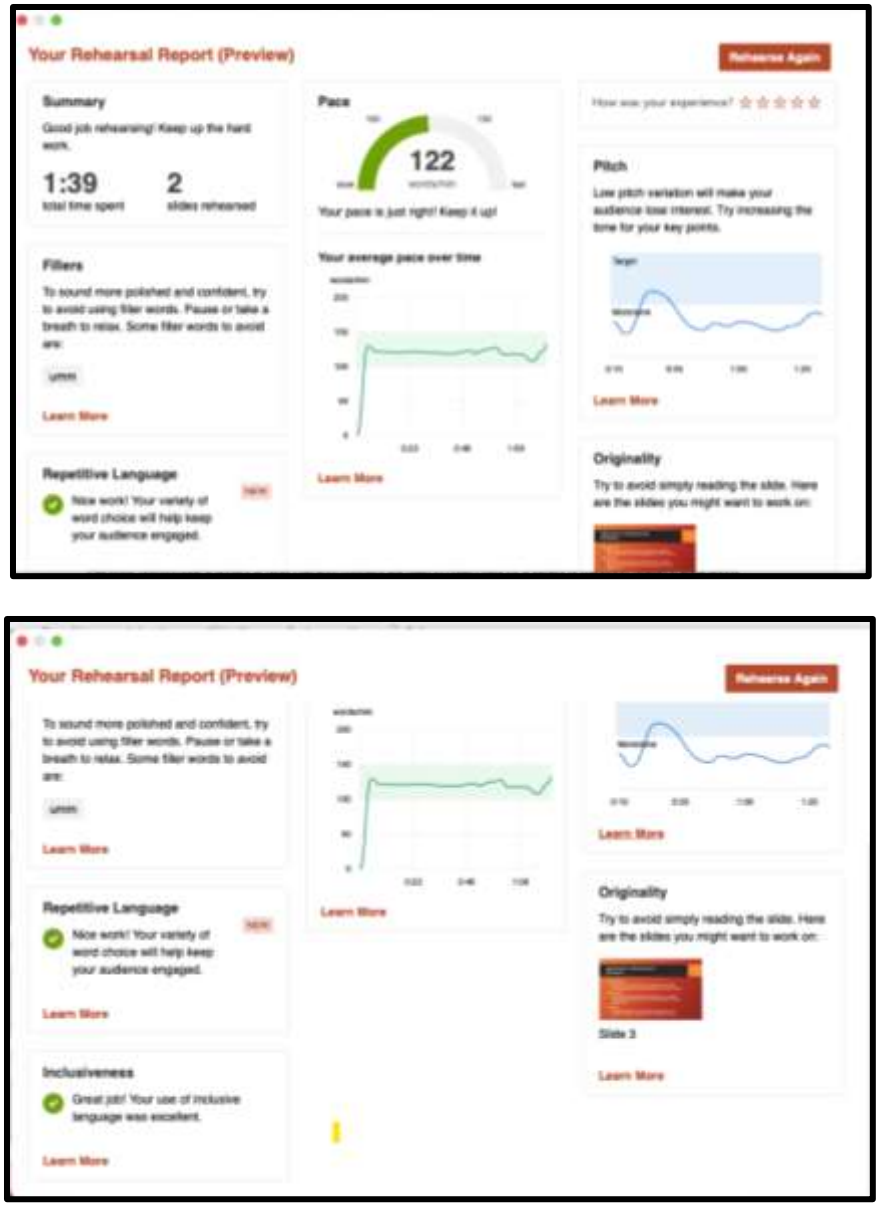


Figure 12. Your Rehearsal Report

If the user is rehearsing with PowerPoint online and did turn on body language analysis, additional information is presented in the rehearsal report as seen in figure 13.

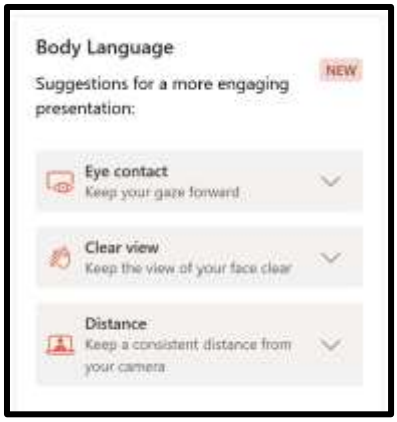


Figure 13. Body Language Analysis

As the above discussion and illustrations show, Speaker Coach can help users improve their presentation skills by practicing more effective presentations. By evaluating a presenter's pacing, pitch, use of filler words, informal speech, euphemisms, and culturally sensitive terms, as well as detecting when the speaker is simply reading the text on a slide, the Coach can help make each actual presentation an effective one.

Microsoft Office Mobile App

Packed within the Microsoft Office Mobile App are several handy features. Besides having access to Word, Excel, and PowerPoint in one app, several valuable actions are available within the app. Being able to sign a PDF, converting a PDF file to a Word document, and extracting a table into Excel from a picture are features used most often by one of the authors of this paper. A recently added feature is the Rehearse with Coach. Microsoft states, "Take advantage of a seamless experience with Microsoft tools on the go with the Office app, the simple solution for productivity, document, spreadsheet, presentation, and file management," (Google Corporation, 2022). The app is available for iPhone, iPad, and Android use. Figure 14 shows the Actions screen with all the available actions. The user is giving a choice of creating a new note, scan, Word, Excel, PowerPoint, or PDF file by clicking on the "Create" button.

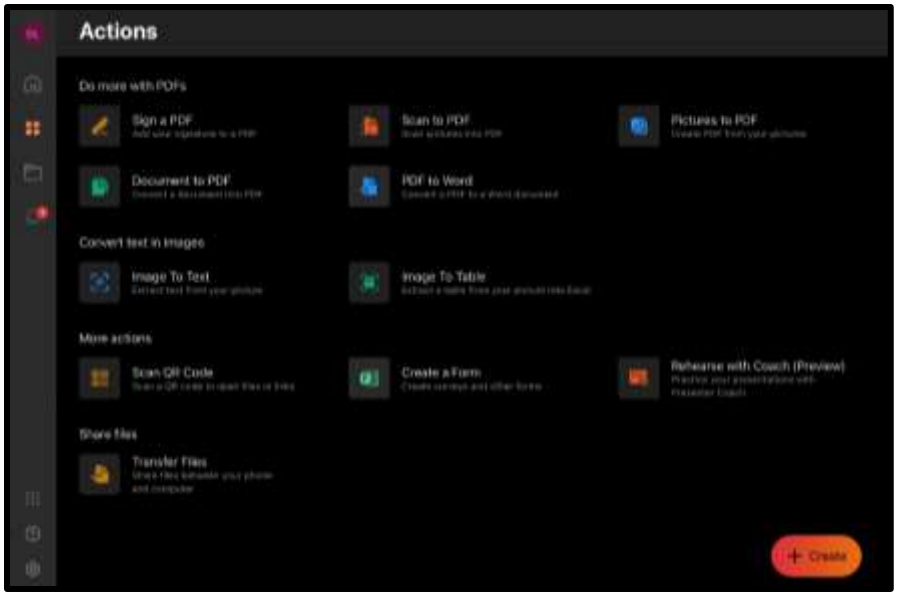
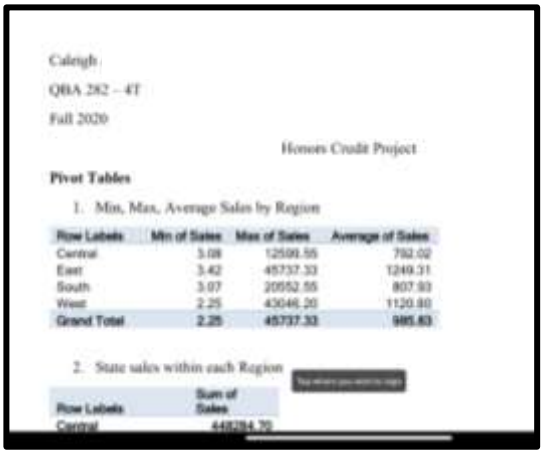


Figure 14. Microsoft Office Mobile App Home Screen

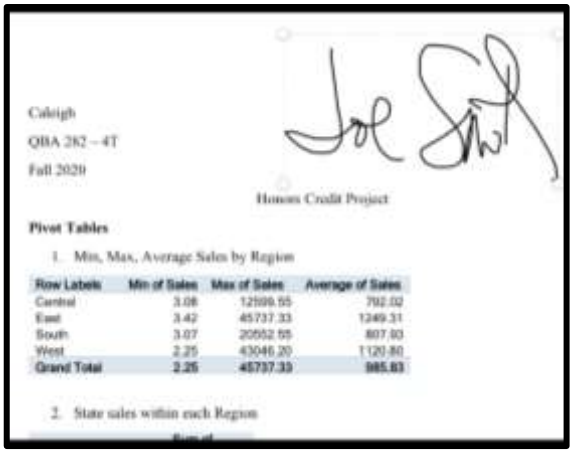
Using the "Sign a PDF" action, in four simple steps a PDF can be signed, and the signature can be saved for future use. Figure 15 displays the four steps.



Step 1 – Received PDF

Step 2 – Signature box appears when user taps on the screen

Step 3 – Signature is complete

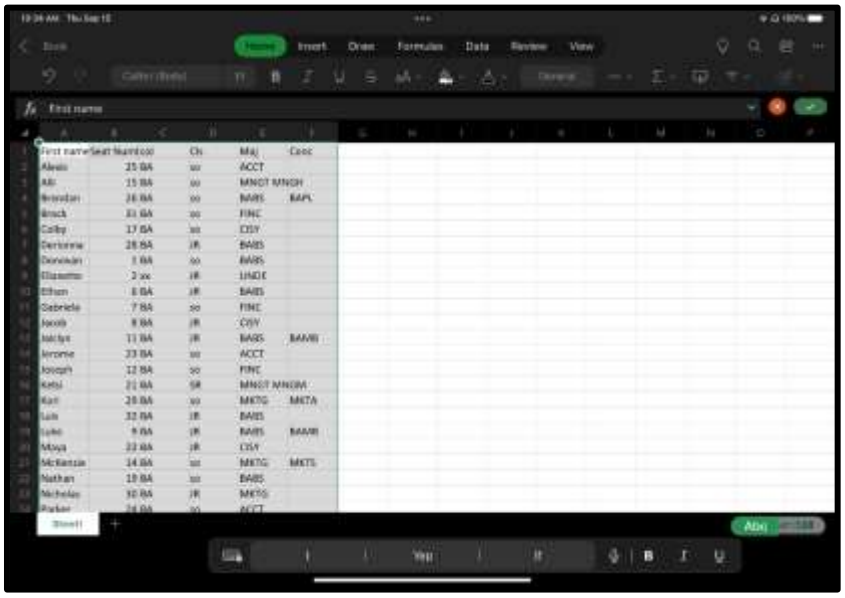


Step 4 – Signature is added to PDF; it can be moved/re-sized

Figure 15. Steps to Sign a PDF

Using the "Image to Table" action, "by snapping a picture or uploading a photo from your camera roll, one can transform a photo of a table into a usable Excel spreadsheet to work with the data," (Google Corporation, 2022). Figure 16 displays the photo of the table and the resulting Excel spreadsheet.

Photo of Table



Resulting Table

Figure 16. Image to Table Action

In addition to the above-mentioned features, there are hundreds of add-ins available at the AppSource Office Store website (Basu, 2022). The AppSource website is located at https://appsource.microsoft.com/en-us/marketplace/apps?src=office. Most of the apps will work with the various Office components versions.

CONCLUSIONS

Many colleges and universities continue to teach a software productivity tools course to enable students to increase their work product in both future coursework and in their careers. As the brief literature review noted, a white paper commissioned by Microsoft Corp. and released by the International Data Corporation (2013) identified the importance of oral and written communication, as well as software suite proficiency, as skills necessary in high-wage occupations.

Over the decades since the initial release, the application suite has continued to evolve and provide users with increased tools and features which can be used on virtually any device anywhere in 2022. This paper has discussed capabilities of both the Microsoft Editor and Speaker Coach. For students who are perhaps weak in grammar and other written communication issues, the Editor can assist in producing a higher quality document than the writer's efforts alone may allow. Quality written material, whether it appears in a formal document, in an email, on social media of some type, or on a presentation slide, can impact an individual's success on the job. Likewise, the Speaker Coach can assist in critiquing and guiding a presenter to a more effective actual presentation that likewise can impact an individual's success in the work environment. The Microsoft Office App features such as electronically signing a PDF document, converting a PDF to a Word document, and converting a picture of a table to an Excel worksheet offer other valuable productivity tools for today's mobile workforce. For Microsoft Office users, learning the new features of each release and version will give them the opportunity to improve their overall proficiency with the software, and allow the various applications to improve the quality of work they produce by correcting grammar errors, helping to improve their communication ability, and allowing for mobility.

To best serve today's business students, the productivity tools course can include these features within the course content, even though they may not be addressed in the course textbook. Knowing about and using the features in Microsoft Editor and the Speaker Coach in PowerPoint could be a "game changer" for a struggling student. With this additional knowledge, students can improve their oral and written communication, and their overall productivity, bringing a stronger skill set to their employers.

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