Digitally Native, Yet Technologically Illiterate: Methods to Prepare Business Students to Create Versus Consume

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This paper discusses the technology gap in today's students where students are often believed to be more technologically astute than they really are. Students are consumers of technology, but they have limited skills in using technology to solve business problems. Three recommendations are presented that could aid educators in bridging this gap: building proficiency of business software in an academic setting, educators being the convener of learning in a digitally focused classroom, and applying design thinking in a classroom setting. An example of how these principles can be used in the classroom is provided. Helping students to bridge this gap will allow them to be better prepared for career success.

Keywords: creativity, design thinking, digital literacy, technological literacy, technology preparedness

INTRODUCTION

As technology continues to become more critical for business success, an interesting paradox has occurred. The younger generation of workers, although raised with and on technology, are not as technology savvy as the older generations believe. Indeed, many millennials (born between 1981 and 1996) and the Generation Z population (born after 1997) have learned to be great consumers of technology, but they are far less adept at understanding how to use technology to create useful solutions to their business challenges as once believed. This paper will provide some background on this phenomenon and provide three recommendations to help prepare technology "creators" for the future.

In fall of 2019, over 19.9 million people enrolled at a four-year institution in the United States of America (Wilkinson-Flicker, 2019). The majority of those students are from Generation Z. Indeed, students trotting across the quad in yoga pants, with a latte in one hand and a cell phone in the other, is a familiar scene on college campuses. A series of taps, swipes, and peculiar facial expressions make it obvious to the passerby that this individual is sending something to someone via one of the numerous multimedia messaging apps.

With technology being such a dominant part of life as a college student, parents often share a familiar allegory that their son or daughter understands technology better than they do. After all, the kids grew up with it. More than 50% of K-12 school districts report having a 1:1 student to laptop program (Mathewson, 2016). As a result, it seems logical to assume students' technological literacy is at the highest levels it has ever been.

Nevertheless, when shifting from communicating with emojis to the written word on a document, the narrative starts to change. College technology administrators have noted that while students are quite adept at using their cell phones, they may not be computer fluent. As one Chief Technology Officer noted "just because you can make a video on a phone doesn't mean you're comfortable with a computer" (Skebba, 2020). Moreover, many students agree that they are not tech savvy. They may be comfortable playing video games and using basic software, but beyond that there is much they do not know (Abamu, 2017). Simply stated, students may be efficient consumers of the benefits of technology, but they may not know how to "create" with technology.

Over two academic years from fall 2017 to fall 2019, over 100 students in a class entitled Microsoft Office Applications were asked to rate their skillset of Microsoft Office on a scale from 1-5, with five being the highest as a formative assessment. The mean was 2.2. Of course, the goal of any college class at a minimum is to take a subject area where a student may know "nothing" and shift their knowledge into "something." So, a self-assessment at 2.2 may seem normal at first glance. After all, a class like "Managing in the Global Economy" might produce a formative assessment mean anchored even more closely to the lowest end of the scale. But Microsoft Office is a productivity suite designed to write documents, analyze data, and create presentations – tasks today's students have likely been doing electronically for decades, long before the college level.

Admittedly, self-assessments are somewhat accurate at best (González-Betancor, Bolívar-Cruz, & Verano-Tacoronte, 2019); however, based on the numerous questions professors in these classes receive, it is safe to say something is awry. Inquiries such as "How do I set this double spaced?", "How do I put this in a folder?", "How do I attach this in an e-mail?", and/or "How do I get this picture from my phone to my computer?" may be attributed to simple technological ineptness but remains remarkable given the fact that this generation did indeed grow up using technology.

Further complicating students true understanding of technology is the issue that students often rely on an entrant to the educational technology landscape that would have been unthinkable years ago: Google. In the space of less than six years, Google has bypassed the business-focused grip of Microsoft in the high school computer lab and Apple in the creative setting (Schoolov, 2019). More than half of primary and secondary students in the United States use Google education applications, such as Google Classroom, Google Docs, and Gmail (Schoolov, 2019). While Chromebooks struggled to find a niche amongst consumers in their opening years, they have found one now – the schoolhouses of America. Google went from an interesting possibility to the dominant way that schools around the country are engaging technology in the classroom (Singer, 2017).

Schools get cheap technology, education-specific solutions, and enterprise-wide management. Meanwhile, Google gets to be embedded in the youngest generation as the de facto provider of e-mail, cloud storage, and document creation. What do the students get? Skills that are not relevant in the world. Most corporations do not run off Chrome OS, create reports in Google Docs, nor begin boardroom presentations on a Google Slide. In fact, only fifteen companies listed in the S&P 500 are using Google's productivity suite (Dave, 2018).

In a 2013 study by Harris Interactive and Chegg, fewer than two out of five hiring managers found that college students were prepared for a job in their chosen fields (*Bridge That Gap: Analyzing the Student Skill Index*). Yet, International Data Corporation, a consumer market research firm, found Microsoft Office is one of the most desired skills. In a list of the 20 specific skills for "high-growth" and "high-wave" occupations, Microsoft Office proficiency is rated at number three (Cushing Anderson, 2016). Ironically, even job postings from Google reference proficiency in Microsoft Office as a requirement (Bishop, 2012): from an account manager in Austria (needing Microsoft Office "including PowerPoint") to an executive compensation analyst to support Google's board of directors ("proficient with Microsoft Excel").

Consequently, although it may seem peculiar that Microsoft Office continues to be taught as a college-level course, many professors may ponder: Is it the most exciting material in the college? Definitely not. Does it have value? Absolutely.

Microsoft Office in the curriculum is not a bad thing; it is a good thing. But, in isolation, it is not the solution. The solution is one level higher – technological literacy. Though technology virtually surrounds

almost everyone in academia from students to faculty, it does not equate to proficiency, particularly at the student level. The opportunity has arisen to fortify the technological component to the college curricula and student experience overall. In this paper, three recommendations are presented on how to improve technological literacy through the classroom experience. These examples serve as inspiration and opportunities for educators and colleges to better prepare students for the demands of the workforce today.

TECHNOLOGICAL PREPAREDNESS

It is easy for educators to falsely assume today's students know how to use technology to a deeper degree than they do. While it is likely students spend more time using technology on a daily basis than an educator, the needs of the two audiences are different. As a result, technologically focused tasks may result in completely different use cases when viewed from the polarized lens of the student and the educator. Figure 1 contrasts the technology needs of an educator versus those of the students.

FIGURE 1
CONSTRASTING TECHNOLGY NEEDS OF EDUCATORS VERSUS STUDENTS

Educator Need	Student Need
Create a presentation to guide a lecture	View a presentation
Create a video to support teaching a lesson remotely	View a video to glean content from the lesson
Create a homework assignment to reinforce key concepts	Complete given handout or online assignment
Create a handout or takeaway	View and fill-in information into document
Create a unit bringing together print and digital resources	View resources to complete corresponding classwork

Educators often use technology in a similar setting businesspeople do – to create. Conversely, students are often the receivers – or consumers – of the knowledge from an educator.

The dichotomy of teaching Microsoft Office is that the software forces students into the dual role of both creator and consumer in a way few other college classes do. A typical class requires a student to receive information, where they then seek to draw inferences on and retain information. In a Microsoft Office-driven class, the student is required to do all of the aforementioned tasks, while applying the knowledge through the creation of a deliverable, whether it be a document, spreadsheet, or presentation.

The skill of creation is fundamental for a successful career, as students frequently need to "create" in order to achieve positive career outcomes. Further, a common tool to create relies on applications in the Microsoft Office suite. For example, using Outlook to send e-mail, Word to prepare documents, Excel to analyze data, and PowerPoint to communicate through presentations.

Students who "create" have a deeper understanding of the tools utilized in the workplace and will likely have a less difficult time adjusting to full-time employment. Furthermore, when students create, they employ characteristics of creativity and are more likely to produce in an innovative way, given the interconnectedness of creativity and innovation on an individual level (Sarooghi, Libaers, & Burkemper, 2015). In a work context, success is not noted through correctly answering a multiple-choice test, but instead drafting a compelling textual and visual argument in a Word document or being able to communicate, educate, and influence through PowerPoint. Even to the highest office of government in the United States, the President is believed to be briefed in the Situation Room through the medium of a PowerPoint presentation (Bumiller, 2010).

Students today are surrounded by technology, yet they use it from the posture to consume the variety of content around them, e.g., sending pictures, sharing videos, short-form communication. These skills, while tread toward honing multimedia proficiency, do not translate into business success. To better prepare

students for the realities of the adult-workplace, students must receive more technological opportunities to create not just consume. Three recommendations are presented below.

RECOMMENDATIONS

Build Proficiency of Business Software in an Academic Setting

Beyond the proliferation of Microsoft Office, a wide variety of other tools are gaining traction in the business world. While the broad basis of theory found in the curriculum of most business schools is important to career success, exposure to and skills in various technologies often yields greater on-the-job application. Skills learned in a software proficiency course, especially applications which have broad usage across the business-world, create a foundation of knowledge instantly applicable on the job.

Yet, regardless of academic discipline, the corporate world is increasingly relying on a suite of tools to enable virtual collaboration and creation in the globalized economy. The functions of employees today center around five technological needs as a part of the digital workplace (see Figure 2):

Web conferencing: Technologies to enable remote, geographically dispersed individuals to hold live meetings, conferences, presentations, or webinars. These tools integrate audio and video conferencing, screensharing, and basic annotation capabilities.

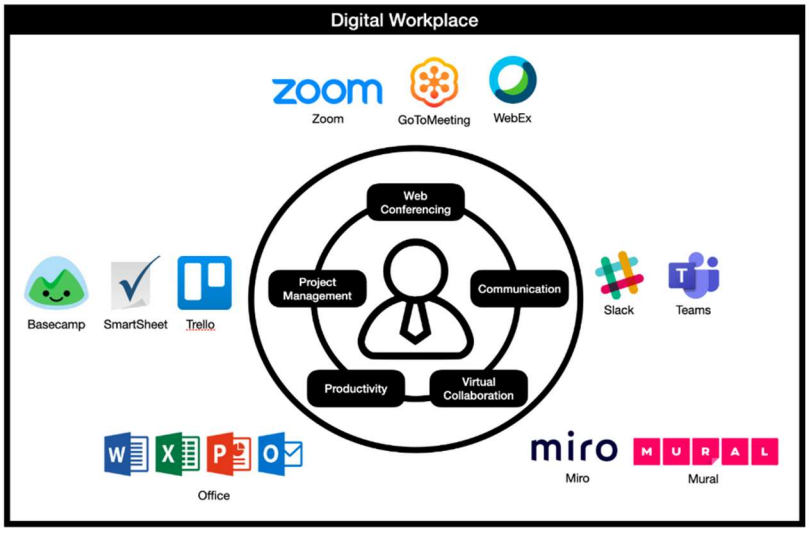
Communication: Business communication tools provide for users to communicate without using e-mail, SMS message, or physical mail. Individuals can send instantaneous messages from one person to another or communicate widely in a group. Communication platforms often include the ability to share or transmit files across users.

Virtual collaboration: Digital collaborative workspaces provide a "digital whiteboard", providing the ability for users to create, attach, and link to various types of content. An infinite canvas provides flexibility for ideation and collaboration. Add-ons or extensions offer more advanced capabilities such as voting.

Productivity: Application software can be used to create documents, spreadsheets, presentations, calendars, contacts, and send electronic mail.

Project management: Application software is used to create tasks, assign tasks to resources, track progress of projects, maintain a schedule, and analyze work status.

FIGURE 2
FIVE TECHNOLIGICAL NEEDS IN THE DIGITAL WORKPLACE



Students need to learn, tinker, and apply software spanning the five dimensions of the digital workplace. For example, rather than upload a lecture capture or a web conferencing tool from the learning management

system, professors and students could try one of the web conferencing tools being used by Fortune 500 companies such as WebEx – currently the market leader being employed by 95% of the Fortune 500 (Ravichadran, 2018)

Wouldn't it be nice to receive less e-mail? Perhaps, faculty could communicate with students through the creation of a channel or team in Slack or Microsoft Teams. Communication tools provide a space for dialogue through channels which help to organize questions, share ideas, or create moments of peer-to-peer learning.

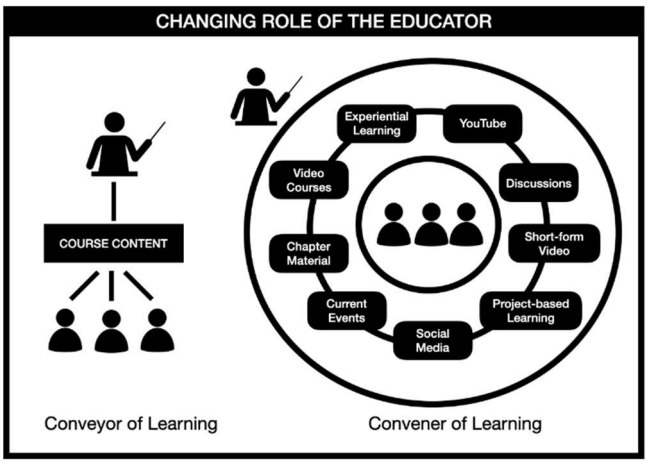
Professors could transition from a physical whiteboard to a digital one through virtual collaboration application. Web-based tools provide a collaborative environment to teach and create. The teacher could host a brainstorming session with a built-in timer, divide students into groups to tackle an assignment, and/or allow students to collaboratively work on a single assignment.

When teaching the concepts of Microsoft Office, the class requirements should be aligned with the standards of Microsoft's Office Specialist certification. As a result, students leave at the end of the semester with not only a letter grade, but with a credential that reinforces to employers the student's practical and applied knowledge in this popular job qualification. Moreover, group projects could be created with project timelines and a process that move through completing tasks in a way that is aligned with the principles of Kanban, a workflow to organize a project from beginning to end. Using these tools provides a new, more relevant way to teach and gives students exposure and experience to the same (or similar) tools they will be using in their career. Therefore, exposing students to experiential assignments and activities across the spectrum of technological skills available for business will help prepare students to excel when they start their careers.

Be the Convener of Learning in a Digitally Focused Classroom

As students continue to consume digital content around them, educators have the opportunity to integrate similar digital tools into the classroom experience with an educational spin. The model of education has shifted. The professor no longer needs to be a megaphone for the content – serving as a conveyor of content to the students through a passive presentation. Today's educators need to embrace the role of a convener, bringing in resources, knowledge, experiences, and media from a variety of sources (see Figure 3). In fact, many of the same locations where students spend a notable percentage of time – on their phones, can be flipped and used for educational purposes. Further, these resources can be used to change the students' perspective from consumer to creator.

FIGURE 3
EDUCATOR SHOULD MOVE FROM A CONVEYOR OF LEARNING TO A CONVENOR OF LEARNING



As YouTube's popularity has proliferated, the platform has only become more engrained into the fabric of life. According to a survey by Google, parent company of YouTube, 50% of Generation Z and Millennials "don't know how they'd get through life" without video (*What The World Watched in a Day*, 2020). Studying the viewing habits of 12,000 individuals, the younger generation were found to more likely to seek out short-form content (ex. tutorials, video clips, or webisodes) than longer, more in-depth offerings (*What The World Watched in a Day*, 2020).

Educators can utilize this behavior to unearth knowledge from video sharing platforms like YouTube, video courses like Lynda.com, and educational content found on social media to create a learning experience with students at the center, and later in the semester, have students create a deliverable to be uploaded to one of these tools. For example, contributing to YouTube provides a crash course in storytelling – a skill CareerBuilder calls a "must-have" (Half, 2020). Even a typical essay can morph into a hybrid combining YouTube, animations and/or interactive elements.

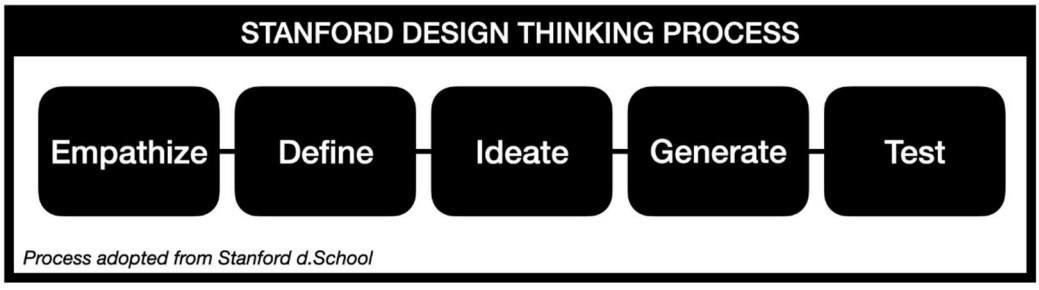
When students see the tools they are using for casual communication or consumption as tools that can be used to enable productivity, promote learning, and build a personal brand, students are able to end a semester with a tangible output and a portfolio builder, rather than an abstract letter on a transcript. In a world that is increasingly becoming more "visual," educators that promote a more collaborative technology learning experience will be significantly increasing their students' preparation for the work world.

Apply Design Thinking in a Classroom Setting

In addition to exposure to the various technology applications and collaborative tools, the need for innovation and critical thinking are increasingly appearing on job postings and in recruiter pitches. For over forty years, a process called design thinking has been used by practitioners to drive innovation and promote critical thinking within organizations. Innovation-based consulting firms such as Ideo and Frog have helped numerous Fortune 500 clients spark new ideas, processes, and products across their lifetimes (Brown, 2008; Frog, 2016). Furthermore, businesses are realizing that innovation does not require simply an "outside in" perspective, but also an "inside out" one (Simanis & Hart, 2011). Companies as creative as Intuit, as tenured as IBM, and formal as Fidelity have all invested in innovation-focused capabilities ("5 Big Organizations Winning with Design Thinking," 2018).

Integrating design thinking into the classroom allows students to become the "problem solver" of business challenges, as they move through the process of listening to pain points, flaring on ideas, building solutions, and testing them with people. Design thinking is a unique blend of process and application and is often a catalyst to build creativity, collaboration, and co-creation – with students at the center of the action. Stanford's Design Thinking Process is an excellent starting point for this discussion in the classroom (see Figure 4).

FIGURE 4
STANFORD DESIGN THINKING PROCESS



Using the Stanford Design Thinking Process, students receive direction on an abstract challenge, problem, or issue, and move through a process of creative discovery. First, students learn about who the problem is affecting, empathizing with users through observation, interviews, or research. Next, students

define the right lens by which to tackle the problem and determine if the given abstract challenge is the actual challenge to solve, e.g., whether it is the root cause, or if a more meaningful offshoot exists. With the knowledge of the "who" the problem is affecting and "what" to address, students transition to ideating and generating a wide and diverse solution-set to solve the challenge. Through discussion and narrowing, students generate a low-fidelity prototype to give a physical manifestation to their ideas, prompting more discussion. Then, students test the proposed solution with the group of individuals in the empathize stage to see if the proposed solution does indeed meet the user's need. Though design thinking is stated as a process, it is more of a mindset – to be curious and continuously refine and define a problem or idea, until a solution is successful (Kadam, 2018).

Participating in the design thinking process requires active participation, ideation, and creation, as well as application of technology to a specified project. Students need to record insights, draft ideas, design through ambiguity in generating a prototype, and document results of user tests. Incorporating the use of this process in students' curriculum should enhance students' ability to think critically and innovate and make a positive impact on their careers.

CLASSROOM EXAMPLE

In fall of 2020, a pilot course entitled Business Innovation Methods with Design Thinking was piloted with a group of 23 multidisciplinary students at The University of Toledo equipping them to solve a challenge at the university: how might we improve the student experience at The University of Toledo?

This class served as a different form of business education moving from theory or case studies to hands-on application. In the half-semester, seven-session class, students received an overview of the design thinking process, and moved through each of the five phases of the Stanford d.School model: empathize, define, ideate, generate, and test.

The class was structured in a way that integrated aforementioned methods to allow students to "create" versus "consume". Student feedback was positive, earning an overall 5.0 score out of 5.0 across each aspect of the quantitative student evaluation. Selected qualitative feedback included the following quotes:

"The design thinking activities were uncomfortable for me; however, they helped me gain new thoughts and ideas on how to navigate through problem solving."

"Going into this you might not have had any idea how it would impact students...but I think I speak for everyone when I say that this course has made us all push our creative boundaries. We all learned something about ourselves as well as our peers. This is what an education is about...walking away with lasting skills and knowledge."

With the increasing movement to online, virtual, and hybrid classes, a high-level example is provided below. The example uses the Stanford Design Thinking Process as the course organizing framework and demonstrates how the other two recommendations could be applied in the classroom across the course (see Figure 5).

FIGURE 5
CLASSROOM APPLICATION EXAMPLE OF RECOMMENDATIONS

Activity (Design Thinking Process)	Impact	Recommendation
Empathize: Class students independently design an interview protocol and interview peers about their perceptions, gaps, wants, and needs in the student experience at the university.	Students learn and apply how to design an interview protocol formulating a series of questions aligned to a common objective (ex. Microsoft Office). Students use a web conferencing tool (ex. Zoom) to host the interview.	Build Proficiency of Business Software

After completing the interview, students independently summarize their findings and create an empathy map, highlighting what their respondents said, how they thought, how they felt, and what they did in relation to the student experience. Students form small teams in the class to discuss their findings. These teams remain throughout the duration of the course.	Students use a virtual collaboration platform to view findings and spot themes (ex. Miro). Educator demonstrates (with YouTube and other social media options) the software tools available to synthesize and analyze the data and encourages students to use them. Students learn and applied the benefits of open-ended questions, how to guide and structure a free-flowing conversation, notetaking, and the benefits of change through user-centered design.	Build Proficiency of Business Software Convener of Learning
Define: Being grounded in insights from end-users, students learn of and explore the selected challenge statement (How might we improve the student experience at the university?) across different altitudes through the use of an abstraction ladder, making the problem larger (ex. How might we improve the student experience at universities across the country?) or smaller (ex. How might we improve the commuter student experience at the university). As students consider looking at the challenge statement from different levels, they use end-user research, secondary research, and guided conversation to determine which challenge statement would be the most beneficial to solve. Each team votes on what challenge statement they believed was most beneficial. The challenge statement receiving the highest number of votes or group consensus is selected.	Educator guides students through the process of how to explore a problem space through problem framing in order to gain alignment on what problem a team or organization is trying to solve. Students independently engage in secondary research, learning from other avenues outside the classroom (ex. YouTube, via search engines, Wikipedia). Students use a virtual collaboration tool (ex. Mural) to organize information, and a communication tool to discuss findings (ex. Slack). Through activities and guidance from the instructor and outside resources, teams apply contextualizing the problem, students determine its value, assess its relation to the end user, and align on a particular problem to solve.	Convener of Learning Build Proficiency of Business Software Convener of Learning
Ideate: The challenge statement receiving the most votes is selected for each group to ideate potential solutions against.	Educator leads students through a creative brainstorming, drafting potential solutions aligned to a user-driven need, using integrating brainstorming, timing, and voting	Convener of Learning Build Proficiency of Business Software

Teams independently brainstorm solutions to their challenge statement, writing each separate idea they had on a notecard (or virtual platform). In this stage, students were tasked to generate as many ideas as they could within a time limit – preferring quantity of idea over quality. As time expires, each student in a group shares their ideas quickly with their group. Groups then vote and engage in debate in selecting the "best" idea, or collection of ideas should they be connected, to move forward with based on a set of criteria provided by the instructor.	capabilities within a virtual collaboration platform (ex. Miro). Through ideation, students turned problems into solutions, casting a vision for a better way.	
Generate: With each team focused on one idea to advance, students create a low-fidelity prototype to represent their idea. If in a physical classroom, craft supplies can serve as a cost-efficient method to creating a low-fidelity prototype. In a virtual environment, students can create a digital manifestation using digital apps or platforms. Prototyping puts meaning behind the concept, allows for discussion and learning at deeper dimension, and adds substance behind a particular idea.	Students create, in a physical (i.e. paper/craft supply based prototype) or virtual sense (ex. Figma, Wix, Microsoft Office), a solution, bringing together insights from in-depth interviews, problem analysis, and ideation, resulting in a deliverable – a solution to the group's given challenge. Educator demonstrates software options the aid students with the virtual creation of prototypes. Educator guides students through discussion facilitation exercises and examples.	Build Proficiency of Business Software Convener of Learning
Test: Students test ideas, explain, pitch, and receive feedback from a panel of leaders in relation to their concept.	Educator coaches students on how to communicate to both educate and influence in a room of stakeholders.	Convener of Learning

CONCLUSION

Many educators falsely assume that students know how to create with technology, when in actuality, it is unlikely they do. It is imperative for faculty to recognize the importance of teaching technology and its many business relevant applications, especially in the lower division of a college curriculum. As a result, all students will have a common basis of technological knowledge and are able to apply it – whether in expressing themselves, their life-long learning, or in their line of work.

The implementation of these three recommendations presented in this paper will allow for opportunities to help students create versus simply consume technology. The intention is that should these techniques be implemented, students will be better prepared to use, create, and contribute to the learning process and

workforce. With new tools to learn, and new ways to express themselves, creating provides an outlet for students to be more productive and successful in their careers.

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