

Teaching Generation TechX with the 4Cs: Using Technology to Integrate 21st Century Skills

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As we journey further into the 21st century, apprehensions emerge among business leaders in American markets. These concerns do not go unwarranted or unnoticed. Contemporary data portrays a despondent picture regarding new graduate preparedness for the global workforce. The findings reveal that employers feel the new entrants are deficient in the 21st century skills imperative for current market progress and profit. The critical 21st century skills employers demand are critical thinking and problem solving, communication, collaboration, and creativity and innovation- the 4Cs. The challenge is: How do educators better prepare students for 21st century skills utilizing technology as the conduit? This paper highlights three strategies (amendable to immediate, low cost, interdisciplinary implementation) that educators could utilize to foster student preparedness for the 21st century workforce. Strategies include: (a) becoming cognizant and literate in Web 2.0 tools; (b) assigning real world problems and issues for students to resolve using technology; and (c) creating collaborative problem-based learning experiences utilizing the resources available via the Web. Accurately employing these pedagogical methods may reclaim American academic and labor market resplendence.

We are at a decisive crossroads in education stemming from the speed of technological advancements outpacing pedagogical practices and the requisite skills students need to be globally competitive. As such, we are left with a disparity between the skills graduates are possessing and those which employers seek (Baker, 2011; Bradford, 2011; ManpowerGroup, 2011). Statistics revealed 28% of recent high school graduates that took the ACT failed to adequately pass basic skills in math, reading, writing, and science (ACT, 2011). In 2009, the Programme for International Student Assessment reported that the United States scored significantly lower compared to other Organization for Economic Co-operation and Development (OECD) countries in math and av-

erage in reading and science (OECD, 2010). Companies, such as Microsoft, Apple, and CISCO, demand a stronger focus on 21st century skills due to the lack of preparedness in these exigencies requisite for the global market (Harvard Graduate School of Education, 2011). According to Microsoft's Citizenship Report (2011), "Workers do not have the technology skills to find and keep employment in the modern economy" (Challenges, para 2). To address these dismal findings, educational practices (which we have relied upon for years) must diligently and intentionally seek strategies to adapt to our changing world.

Cultivating and fostering 21st century skills in all educational environments- utilizing technology as the conduit- has the potential to generate employ-

able, productive global citizens and, in essence, redeem America as a leading educational beacon and producer of extraordinary 21st century talents. Ruminating over the 21st century skills graduates are lacking, causing them an inability to acquire and sustain employment, the challenge facing educators is how to utilize technology to better prepare students for 21st century skills.

REVIEW OF THE LITERATURE

The Partnership for 21st Century Skills (2011) identifies 21st century skills as critical thinking and problem solving, communication, collaboration, and creativity and innovation—more commonly known as the 4Cs. A survey conducted by The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management (2006) found 400 + employers indicated that over half of recent graduates were deficient in oral and written communications, professionalism/work ethic, and critical thinking/problem solving. Complementing these convictions, a poll administered by the American Society of Training and Development (2009) found that 50% of the respondents ranked executive and leadership skills (e.g. supervision, team-building, goal-setting, planning, motivation, decision making, and ethical judgment) as the most inadequate. In the same poll, 46% of the respondents ranked basic skills (e.g. creative thinking and problem-solving) as the most mismatched to what they were looking for. The Conference Board (2011) revealed that 97% of employers surveyed acknowledge that creativity is becoming progressively more germane and “CEOs identified creativity as the most important ‘leadership competency’ for the future” (slide 7).

Employers hold schools accountable for these deficiencies. The Conference Board (2011) asked employers which skill they felt most adequately demonstrated creativity and innovation. Companies reported the ability to identify or articulate problems. However, there is disconnect between what companies perceive exemplify creativity/innovation and what school leaders characterize as creativity/innovation. According to school superintendents, problem solving more acutely portrays creativity and innovation (slide 19). It was also discovered that 83% of executives felt that it is the school’s responsibility to instill creativity and innovation (Conference Board, 2011). Higher education does

not fare much better. Data collected from the Collegiate Learning Assessment found that college students did not make statistically significant gains in critical thinking, complex reasoning, or written communication (Arum & Roksa, 2011). The 2011 SHARE survey revealed that employers expect institutions of higher learning to infuse and hone both written and oral communication skills.

The outlook regarding technology skills is equally disheartening. A report published by the International Society for Technology in Education (ISTE), the Partnership for 21st Century Skills, and the State Educational Technology Directors Association (2011) found that employers feel schools fail to prepare students for a technology-based economy. These technology skills surpass the ability to instant message (IM), play online games, download programs, and master the bells and whistles of Smart Phones. It requires much more. According to Gordon (2011):

Work readiness is no longer just about the three R’s; now it’s also about turning information into knowledge through Web searching and vetting. It’s about developing effective multimedia presentations. It’s about seamlessly using digital tools to collaborate and problem-solve. (para. 6)

Gordan (2011) continues by quoting Don Knezek, CEO of ISTE of stating:

K-12 graduates should understand how to use it to define and break down a problem, look into how similar problems have been solved, and design and implement a solution. In communicating that solution, they should be skillful not merely at typing a Word document but also at telling a compelling story through an interactive multimedia presentation. (para. 10)

Collaborative learning environments are essential to producing a “work ready” graduate. Interpersonal and collaborative skills are considered one of the most desired attributes employers are looking for when hiring (American Management Association, 2011; Kelly Services, 2011; ManpowerGroup, 2011). Appropriate collaboration cannot be actualized unless an individual possesses befitting com-

munication skills. Before composing a message, one must define what needs to be stated, identify the target audience, decide what the receiver needs to know, determine what specifically and succinctly needs to be conveyed, and how to deliver it-face to face, electronic communication, or in a memo (MindTools, 2011). Writing pertinent and relevant documents in the workplace is essential but is not the only means of written communication employers are envisaging. Netiquette skills are essential. Employers are yearning for proper netiquette skills in response to burgeoning virtual communication (Buhler, 2011; Hopkins, 2011). Netiquette is network etiquette; the formal and informal rules of how one should behave while online (University of St. John's, 2004). Employers purport that despite the prevalence of online interactions, new graduates lack the netiquette expertise. According to a study conducted by the American Society of Training and Development (2011), these collaborative and communicative skills are insufficient to meet market demands. The business community assigns culpability to educational institutions (Arum & Roksa, 2011; Wagner, 2008).

Examining this dismal data, it is clear that reliance on traditional educational approaches is insufficient in preparing learners for 21st century skills requisite for the global market. Rather than combatting or disregarding technology, schools need to embrace and integrate it into its pedagogy and curriculum. Utilizing technology, educational facilities can not only teach and equip learners in and for 21st century skills but impart the exigent skills employers desire for technological work place readiness.

STRATEGIES EDUCATORS CAN EMPLOY TO INTEGRATE THE 4CS WITH TECHNOLOGY AS THE CONDUIT

There are multiple pedagogical strategies educators can employ to infuse the 4Cs: (critical thinking and problem solving, communication, collaboration, and creativity and innovation) into their curriculum and instruction; in essence, utilizing technology to create a richer learning environment while fostering these 21st century skills. The following three approaches, I feel best embody a holistic, organic, and authentic representation for 21st century work-ready preparedness: (a) becoming cognizant and literate in Web 2.0 tools; (b) assigning real world problems and issues for students to resolve using technology; and (c) creating collaborative problem-

based learning experiences utilizing the resources availed via the Web.

APPLICATIONS AND EXAMPLES

Real world problems and issues allow students to reason inductively and deductively, analyze, synthesize, and evaluate evidence, arguments, claims, and perspectives, compare and contrast, and draw conclusions predicated upon analysis. These all constitute critical thinking and problem solving. Learners become more motivated and engaged when the learning contends with something they can relate and connect to (Bridgeland, Dilulio, & Morison, 2006; University of Massachusetts Donahue Institute, 2011). Technology can facilitate attaining this by giving students a concrete strategy for exploring real-world issues. For example, web quests promote active learning and critical evaluation of information. To conduct a successful webquest, instructors must first ask the right questions and create relevant and authentic problems to resolve (queries which result in "yes/no" or can be answered by inserting it into the Google search bar is not a quality critical thinking question, regardless of its real world relevancy.) Then, students utilize Internet search features to generate data, evaluate information and form conclusions in response to the inquiry. Key to an effective webquest is the need for instructors to formulate real world scenarios for learners to solve which are organic to the content.

An alternate pedagogical strategy for conducting real world scenarios is through problem-based learning (PBL). There is a profusion of research asserting the benefits of PBL. Copious amounts of studies confirm that PBL increases student performance (Buck Institute of Education, 2011; Lape, 2011; Yadav, Subedi, Lundeberg, & Bunting, 2011; Wirkala & Kuhn, 2011), connects individuals globally, exposes learners to diverse perspectives and rich experiences which foster creativity and innovation (Fruchter, 2006a; Fruchter, 2006b;) and amplifies student motivation and engagement (Augusto, Chang, & Osibanjo, 2011; Ross & Furno, 2011). To execute PBL appropriately, a challenging critical thinking question must be dispensed enveloping a real world problem or issue, require collaborative work by a small group of students, and ensue in the generation of a product to publicly present. While problem-based learning can be conducted without technology, the incorporation of technology resources: a) nurtures and hones 21st

century technology skills, and b) augments student engagement and performance (Richardson, 2011; Software & Information Industry Association, 2010). Learners can utilize the resources availed to them on the Web to research, communicate, collaborate, and create. Let's explore a few examples to survey how educators can effectuate incorporating 21st century skills into their classrooms utilizing technology.

If teaching a business course, the following small group assignment reflects a real world scenario that will nurture and hone the 4 C's:

You own a company going green and have determined that it is cheaper to open a company overseas. Which country would you open it in and why? Using Google Earth, where specifically will it be located? Why did you select that location? Consider commercial activity in the area. Is it accessible to your consumers? What resources will assist your potential profit? How much land do you have available to build your company upon? How much of it will be designated for the building and how much for parking? Do you need to have easements? How will you architectural design the construction of your green company? Is the area conducive to the architectural green design? Are materials available to accommodate this design? Where? How much will it cost to import these materials? Using either Alice or Google Earth, create a 3 dimensional design of your company's building. Will you hire locals to boost their local economy or Americans in order to reduce the unemployment rate in the United States? Which is cheaper? If you select hiring locals, publicity might hamper your profits at home; if you hire Americans, how much will that eat into your profits and be perceived to the locals? Which will you choose and why? How much will you pay the employees? What resources will you use to recruit workers and market your company, such as social networking sites like Facebook, Linked In, or Twitter? What will make your marketing more appealing than other advertisements on the Web?

Present your response in a multimedia presentation. This will be performed digitally and in person. You may use any format you like. For example, you can create a Power Point with Prezi, Splashcast, and SlideShare. You can upload a video you created using various movie making software, like iMovie or Windows Movie Maker and post it on YouTube. These are a few suggestions

for you to employ. Accompany your presentation with a hardcopy compendium. Ascertain you use proper "netiquette" when communicating and collaborating with one another. You may set up a blog, like Blogster or Blogger, a wiki, such as wikispaces, and share your research and documents with tools like Google Docs or LiveMinutes to facilitate your communication and collaborative efforts.

In this example, higher level critical thinking questions are posed. The answers cannot be generated by typing the problem into a search engine bar. The assignment is authentic and relevant to business students. These are inquiries they will eventually be exploring themselves one day. This assignment prepares them for the cardinal and applicable questions they will have to investigate in the real world. The ascribed problem not only teaches and hones 21st century skills but content knowledge in business, math, geography, engineering, politics, economics, and technology. Students must research extensively and master research skills utilizing the internet by determining which sources are current, valid, and credible. It fosters creativity through the process of designing components of the building, determining marketing strategies and exploration of employment opportunities using social networking. Students must communicate and collaborate with one another in order to successfully complete the assignment using blogs, email, wikis, and other online tools to assist sharing their work and progress. They are required to not only present the product utilizing technology but also publicly, sharpening their speaking skills. Lastly, it commissions students to furnish written work, to demonstrate their command of eloquent and articulate writing skills.

Let's look at another example epitomizing how to integrate the 4Cs with technology. There are various online problem-based learning programs students can participate in or start, such as Thinkquest and Destination ImagiNation. Both of these websites allow learners to engage in a problem-based activity, collaborate, communicate, create a solution, and post it publicly for others. If this is the instructor's venue of choice, the real world problem can include the following: You are a volunteer for a non-profit organization (NPO) and are asked to investigate and report on child labor. Using Thinkquest, your group will be required to examine what the child labor laws are? Where they are being violated? Are children willingly partaking in its exploitation? Is

all child labor exploitive? How do children become victims in this market? What role do their parents play? Is it socially acceptable where it is occurring? If so, why and if not, why is it not being curtailed? What are the consequences for those convicted? How you would eradicate its existence?

Create an interactive simulation activity, authentic case scenarios, an interactive map locating where it is occurring, visual reports, and a video. Ensure you recruit two other international students to your group. To alleviate any potential communication barriers with your international comrades, try utilizing Skype or ooVoo. You will present this to the class upon completion.

This assignment is a real world problem, requiring critical thinking questions to resolve the dilemma. It is enmeshed in creativity and innovation directing students to create simulations, case scenarios, interactive maps, riveting reports, and a video. The project is infused with collaboration and communication. Students not only have to communicate and collaborate with their classmates but with two international learners as well. They must be lucid and culturally sensitive in their writing as well as in person. This is a prime example of how technology can connect learners globally and provide opportunities to champion 21st century skills.

In order to effectively integrate technology, an instructor needs to be comfortable and knowledgeable with Web 2.0 tools and applications. The more useful a technological application, the more apt it is of being used (Hartshorne, Ajjan, & Ferdig, 2010). Educators that have a positive perception of Web 2.0 tools are more willing to participate in trainings in order to become more adroit in its practice (Oliver 2007; Yuen, 2010). There are a myriad of accommodating resources educators can refer to become more versed in these applications, such as Go2Web20, Learnitin5, and the Online Education Database. Free webinars are available through Teachers Curriculum Institute, tutorials on YouTube, and professional developments via IDEAL. Universities and other institutions of higher learning offer online resources and professional development (for example, Grand Canyon University's Center for Innovation and Research and Teaching). Educators wanting to assign multimedia presentations should familiarize themselves with a sundry of Web 2.0 tools and learn how to use them, discover what options it furnishes, see what the end re-

sult may look like, and peruse how to troubleshoot. After creating the product, post it for students to view to serve as an example. Perform a demonstration on how to navigate through the application and review how to troubleshoot potential problems. The amount of technological tools procurable can be overwhelming. To mitigate this daunting task, try focusing on becoming adept with just a few Web 2.0 tools you or your students will utilize in class. Once you feel proficient, try adding a few more applications to your repertoire, and so forth.

CONCLUDING REMARKS

The global market is driven by creativity and innovation. It is dominated by critical thinkers and problems solvers communicating and collaborating resulting in stellar solutions and products. Educators have a civic and academic responsibility to teach students the 4C's where utilizing technology provides a logical, efficient means to better prepare learners for global citizenry. I highlight three interwoven pedagogical strategies educators can utilize to achieve these lofty goals: (a) becoming versed and literate in Web 2.0 tools; (b) assigning real world challenges and issues for students to resolve using the Net; and (c) creating collaborative problem-based learning experiences utilizing technology. Instructors need to teach students how to think critically by scaffolding higher levels of thinking to posed problems, instruct and role play appropriate communication skills with a special focus on netiquette, and to cultivate and encourage creativity and innovation by exploring ideas and various forms of artistic expression. Our nation's education is at a crossroads. It is time to embrace the technological pace and 21st century skills students need in order to be successful and competent global citizens

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Jennifer Levin-Goldberg earned her bachelor's in History from Penn State University, master's from Arizona State University in Curriculum and Instruction, and doctorate in Curriculum and Instructional Leadership from Northcentral University. She has been in education for 10 years. Her experience in the public schools includes working as a middle and high school teacher, mentor teacher, Chair of Social Studies, Team Leader, Dean of Academics, and an Instructional Coach. At the collegiate and university level, she served as an Associate Professor at Arizona State University and an Adjunct Online Professor for Grand Canyon University since 2008. Dr. Levin-Goldberg is involved in the National Council of Social Studies, where she serves as the Co-Chair for the Membership Committee and member of the Arizona Council of Social Studies Board of Directors, the Association for Supervision and Curriculum Development, the Social Science Education Consortium, College and University Faculty Assembly, National Social Studies Supervisors Association, and member of Kappa Delta Pi, an academic honor society.

References

- ACT. (2011). The condition of college and career readiness, 2011. Retrieved from <http://www.act.org/research/policymakers/cccr11/readiness1.html>
- Agusto, S., Chang, A., & Osibanjo, R. (2011). Student engagement: Mission impossible. Retrieved from <http://cetl.ucdavis.edu/winter-workshops-2011/>
- American Management Association. (2011). Communication and interpersonal skills: A seminar for IT and technical professionals. Retrieved from <http://www.amanet.org/training/seminars/Communication-and-Interpersonal-Skills-A-Seminar-for-IT-and-Technical-Professionals.aspx#>
- Arum, R., & Roksa, J. (2011). *Academically adrift: Limited learning in college campuses*. Chicago: University of Chicago Press.
- Baker, I. (2011, September 7). Mismatch between employer needs and job seeker skills. Retrieved from <http://www.techjobsites.com/2011/09/mismatch-between-employer-needs-and-job-seeker-skills/>
- Bradford, H. (2011, June 21). Siemens CEO: 'Mismatch' between U.S. jobs available, skills needed. The Huffington Post. Retrieved from http://www.huffingtonpost.com/2011/06/21/siemens-ceo-there-is-mismatch-jobs-unemployed_n_881257.html
- Bridgeland, J. M., Dilulio, J. J., & Morison, K.B. (2006). The silent epidemic: Perspectives of high school dropouts (March 2006 Report). Retrieved from the Bill & Melinda Gates Foundation website: <http://www.gatesfoundation.org/united-states/Documents/TheSilentEpidemic3-06FINAL.pdf>
- Buehler, P. M. (2001, June 1). The growing importance of soft skills in the workplace. Supervision. Retrieved from <http://www.allbusiness.com/management/788014-1.html>
- Fruchter, R. (2006). Explicit choices and emergent work practices in global teamwork. Paper presented at the Joint International Conference on Computing and Decision Making in Civil and Building Engineering, June 14-16, 2006, Montreal, Canada. Abstract retrieved from <http://itc.scix.net/data/works/att/w78-2006-tf109.pdf>
- Fruchter, R., (2006). The fishbowl TM: Degrees of engagement in global teamwork. Retrieved from <http://wgl.n.stanford.edu/projects/2005-2006.html>
- Galagan, P. (2010, February). Bridging the skills gap: New factors compound the growing skills shortage. Retrieved from http://www.astd.org/TD/Archives/2010/Feb/Free/1002_BridgingSkillsGap.htm
- Gordan, D. (2011, March 7). Return to sender. The Journal. Retrieved from <http://thejournal.com/articles/2011/03/07/return-to-sender.aspx>
- Hartshorne, R., Ajjan, H., & Ferdig, R.E. (2010). Faculty use and perceptions of Web 2.0 in higher education. In Yang, H. H., & Yuen, S. C. (Eds.), *Handbook of Research on Practices and Outcomes in E-Learning: Issues and Trends* (pp. 241-259). doi:10.4018/978-1-60566-788-1.ch015
- Harvard Graduate School of Education. (2011). Pathways to prosperity: Meeting the challenge of preparing young Americans for the 21st century. Retrieved from Harvard Graduate School of Education website: http://www.gse.harvard.edu/news_events/features/2011/Pathways_to_Prosperty_Feb2011.pdf
- Hopkins, D. (2011). Develop a guide to support students, who study and engage with each other online, on Internet etiquette: 'Netiquette.' Retrieved from the Bournemouth University website: http://bournemouth.academia.edu/DavidHopkins/Papers/615770/Develop_a_guide_to_support_students_who_study_and_engage_with_each_other_online_on_Internet_etiquette_Netiquette
- Kelly Services. (2011). What employee skills do employers want most? Retrieved from http://www.kellyservices.us/web/us/services/en/pages/careertips_aug10_skills_employers_want.html
- Lape, N. K. (2011). Tiered scaffolding of problem-based learning techniques in a thermodynamics course. Retrieved from the University of Kentucky, College of Engineering website: <http://www.engr.uky.edu/~aseched/papers/2011/312.pdf>
- ManpowerGroup. (2011). "Manufacturing" talent for the human age. Retrieved from the Manpower Group website: <http://us.manpower.com/us/en/research/hardest-jobs-to-fill/default2.jsp>
- ManpowerGroup. (2011). 2011 Talent shortage survey results. Retrieved from the Manpower Group website: <http://www.experis.us/Client-File-Pile/Site-Documents/2011-Talent-Shortage-Survey.pdf>
- Microsoft. (2011). Microsoft 2011 citizenship's report. Retrieved from the Microsoft website: <http://www.microsoft.com/about/corporatecitizenship/en-us/reporting/serving-communities/jobs-growth/>

- Mind Tools. (2011). How good are your communication skills? Speaking, listening, writing, and reading effectively. Retrieved from http://www.mindtools.com/pages/article/newCS_99.htm
- Oliver, K. (2007). Leveraging Web 2.0 in the redesign of a graduate-level technology integration course. *TechTrends*, 51(5), 55-61. doi:10.1007/s11528-007-0071-3
- Organization for Economic Co-operation and Development (OECD). (2010). PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science (Vol.1). Retrieved from the OECD website: <http://www.pisa.oecd.org/dataoecd/10/61/48852548.pdf>
- Richardson, W. (2011). *Blogs, wikis, podcasts, and other powerful web tools for classrooms* (3rd ed.). California: Corwin Press.
- Ross, A., & Furno, C. (2011). Active learning in the library instruction environment: An exploratory study [Abstract]. *Libraries and the Academy*, 11(4), 953-970.
- SHARE. (2011). Closing the IT skills gap: 2011 SHARE survey for guiding university and college IT agendas. Retrieved from the Enterprise Computing Community website: <http://ecc.marist.edu/conf2011/materials/WilliamsSHARE%202011%20IT%20Skills%20Survey%20V2.pdf>
- Software & Information Industry Association. (2010). *Innovate to Educate: System [re]design for personalized learning; A report from the 2010 symposium*. Symposium conducted at the meeting of the Software & Information Industry Association, ASCD, and the Council of Chief State School officers, Boston, MA. Retrieved from <http://siii.net/pli/presentations/PerLearnPaper.pdf>
- St. John's University. (2004). What is Netiquette? Retrieved from <http://www.stjohns.edu/media/3/8fa11d0f37bc4fb296d2ac6413c19894.pdf>
- The Conference Board. (2011). *Creativity and workforce development*. [PowerPoint Slides]. Retrieved from the Institute for Public Policy & Social Research website: http://www.ippssr.msu.edu/PPIE/Presentations/Wright_Presentation.pdf
- The Conference Board, Partnership for 21st Century Skills, Corporate Voices for Working Families, & the Society for Human Resource Management.(2011). *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills new entrants to the 21st century U.S. workforce*. Retrieved from the Partnership for 21st Century Skills website: http://www.p21.org/storage/documents/FINAL_REPORT_PDF09-29-06.pdf
- University of Massachusetts Donahue Institute Research and Evaluation Group. (2011). *Increasing student interest in science, technology, engineering, and math (STEM): Massachusetts STEM pipeline fund programs using promising practices* Retrieved from the DIGITS website: <http://digits.us.com/wp-content/themes/digits/Student-Interest-Programs-Using-Promising-Practices%28P3%29.pdf>
- Wagner, T. (2008, October). Rigor redefined. *Educational Leadership*, 66(2), 20-25. Retrieved from <http://www.ascd.org/publications/educational-leadership/oct08/vol66/num02/Rigor-Redefined.aspx>
- Wirkala, C., & Kuhn D. (2011). Problem-based learning in K-12 education: Is it effective and how does it achieve its effect? *American Educational Research Journal*, 48(5), 1157-1186. doi:10.3102/0002831211419491
- Yadav, A., Subedi, D., Lundeberg, M.A., & Bunting, C.F. (2011). Problem-based learning: Influence on students' learning in an electrical engineering course. *Journal of Engineering Education*, 100, 253-280.
- Yuen, S.C., & Yuen, P.K. (2010). Teachers' use and perceptions of Web 2.0 technologies in teaching and learning [Power Point slides]. Retrieved from http://www.slideshare.net/scyuen/teachers-use-and-perceptions-of-web-20-technologies?from=ss_embed