

An Interview with Shiang-Wei Weng: Digital Immigrants versus Digital Natives

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Abstract

In the field of instructional technology and educational technology, there has always been a discussion about the “great divide” between digital immigrants and digital natives. Teachers often express exasperation as to the lack of skills that students often possess, and the general consensus that purports that the pupils of today are technologically literate and that their “learning curve” is vastly superior to those of past generations. In this interview, Dr. Shiang-Wei Wang responds to questions about the disconnect between the teachers of today, and their skill/competency levels, and the realities of the skill levels of entering students in the schools. Dr. Shiang-Wei Wang has provided a thoughtful analysis of the current situation, delineating the crucial variables and aspects involved in the assessment of the current zeitgeist of students, and the current crop of teachers.

Keywords: *Shiang-Wei Weng, digital immigrants, digital natives*

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Suggested Citation:

Shaughnessy, M.F. & Kleyn-Kennedy, C. (2015). An Interview with Shiang-Wei Weng: Digital Immigrants versus Digital Natives. *International Journal of Academic Research in Education*, 1(1), 21-26.

DOI: 10.17985/ijare.11742

INTRODUCTION

In the field of instructional technology and educational technology, there has always been a discussion about the “great divide” between digital immigrants and digital natives. Teachers often express exasperation as to the lack of skills that students often possess, and the general consensus that purports that the pupils of today are technologically literate and that their “learning curve” is vastly superior to those of past generations. In this interview, Dr. Shiang-Wei Wang responds to questions about the disconnect between the teachers of today, and their skill/competency levels, and the realities of the skill levels of entering students in the schools. A brief biography of Dr. Wang follows to provide the reader with some background knowledge in this realm.

Dr. Shiang-Kwei Wang is an Associate Dean of School of Education at the New York Institute of Technology. Her research interests include technology integration in learning settings, the motivational impact of information and communication technologies (ICTs) on learning attitude and performance, as well as the design and development of interactive learning tools. Dr. Wang is the PI for the National Science Foundation (DRK12- 1020091, 2010-2015) grant. Her academic articles have appeared in Educational Technology Research and Development, Computers & Education, Journal of Science Education and Technology, and Tech Trend. Dr. Wang serves on the National Science Teachers Association Technology Advisory Board, Program Chair of the AERA Computer and Internet Applications in Education SIG, and editorial board of several journals. She teaches courses in Multimedia Authoring, Interactive Courseware Design, and Mobile Learning.

Interview

1. *In your recently published research, you compared teachers and students use of technology. Why science; why middle school?*

We are interested in the third generation of digital natives’ technology usage experience inside and outside of classrooms. The definition of the third digital natives are those who born after 2000. Technology prevalent in this generation includes Mobile phones, tablets, cloud, computing tools, social networking sites. In other words, they live in a technology saturated world so their technology usage experience should be richer than previous two generations of digital natives. Middle school students are currently in this group.

We intentionally targeted school-age students not university students because the university student population in most cases have already filtered out those who have social economic disadvantages and because of this are not representative of the broader population.

As for science, we are specifically interested in science teachers’ technology experiences inside and outside of school, because science teachers have been at the forefront of technology transition. They are usually the early adopters to integrate technology in labs and physical experiments, hands-on activities, field trips and data collection. They are usually the early adopters to integrate technology in labs and physical experiments, hands-on activities, field trips and data collection. Furthermore, NGSS is urging science teachers to develop students’ inquiry skills using cross-curriculum knowledge, including technology skills. It is expected that science teachers integrate technology in their teaching routines.

2. *Do school age pupils surpass their teachers in terms of using technology in their daily lives?*

Not really in this study. Check out Figure 1 in this article, showing that teachers demonstrated richer technology experience both inside and outside of schools. When compared with students, teachers not only demonstrated the same patterns of outside-school technology usage (for entertainment, pursuing personal interests and social network), but also reported significantly higher frequencies of using technologies.

3. *Teens' technology activities seem to be friend-driven and interest-driven; does this transfer to educational technology? Or the classroom?*

Not really in this study. There is a huge gap between how technology is used outside and inside of classrooms. The major factor contributing to the gap is that teachers rarely try to develop students' problem solving or cognitive skills through the use of technology. They need to cover the curriculum and their own evaluation, not a lot of room for adopting student-centered activities. These technology saturated activities usually take lots of time to design and implement.

4. *Do social networking sites (FaceBook, email, gaming) translate to proficient technology skills on the part of students?*

I would say no because these social networking related technologies require very little skills. However, gaming should be discussed separately. Some games do have the potential to nurture students' creativity and communication skills, for example, Minecraft.

5. *Teens' use of technology outside of school also seems to be driven by entertainment; how does this impact educational endeavors?*

As educators, we should explore the educational values of technology teens use outside of school, and figure out ways to integrate them into the curriculum. They are highly motivated when they have opportunities use technology to learn. If integrated right, educators can not only develop students' technology skills, but also have positive impact on their learning outcomes and learning motivation.

6. *Students use word processing, send emails, prepare powerpoints, and use spreadsheets; does this align with teachers' use of technology in the classroom?*

Word processing, emailing, web searching, and creating Powerpoint slides are most frequent technology usage in the current classrooms. The problem is that there seems no integration of other technology or use these technology with innovative way. Students use these technologies just like they use traditional ways to express their thoughts. They don't really get a chance to practice cognitive skills other than completing the assignments.

Spreadsheet, on the other hand, is relatively less seen in the classroom. It is considered as a cognitive tool and it can support teachers to develop students' skills in many aspects. The question is, how many teachers actually use it in the classroom?

7. *Who owns more technology gadgets; teachers or students?*

Both teachers and students have access to lots of technology gadgets. More teachers have access to smartphones than students, probably because some parents do not want their kids to be equipped with cell phone in middle school.

8. Who has more confidence in their technology skills?

We did collect teachers and students' confidence in using technology, but did not report the result in this study. The result revealed that teachers have much stronger confidence in using technology than middle school students. However, the qualitative data also revealed that the self-report confidence data does not reflect teachers' actual technology skills. Since teachers use technology to work on administrative and curriculum related work, they are much more proficient in these productivity tools and spreadsheet tools than students.

9. Tell us about the formal and informal technology survey.

The questionnaire consists of three sections: (1) technology ownership; (2) technology experience outside of school and (3) technology experience inside of school (science class). The survey was developed through the following stages. The first step included reviewing literature related to ICTs integration in the classroom to identify observation protocols and identify ICTs that are related to this study. Step 2 was to recommend and examine observation items by five researchers specialized in technology integration, research methods and statistics analysis. Step 3 was to pilot the survey to a class of school-aged students—who were not part of the primary study—and revise the wordings of each item based on the students' feedback. Internal reliability was established with Cronbach's alpha (Cronbach 1951; Cortina 1993) using the pilot study participants and meeting a target alpha of 0.8.

10. Why New York and Utah?

It's a challenge to survey sufficient students who represent the U.S. population. New York is described as one of the most diverse states in terms of ethnicities so we decided to survey New York students. We also surveyed Utah students because we want to know if result would differ between these two states, because Utah is one of the states with most singular ethnicity (92 % Caucasian).

11. Teachers seem to need more time to maintain and integrate technology into their classes. Do you have any suggestions for addressing this?

They need time because they are not familiar with some of the technology, or not familiar with new pedagogical practices facilitated through technology. We need to first convince teachers these changes will have positive impact on students' learning motivation and outcomes. Once they believe that technology integration is necessary, it will be a lot easier to change their classroom practices. They will be willing to invest time and energy to integrate technology.

12. Was the outcome of your research surprising? Why or why not?

In some ways. People always say that the digital natives are technology savvy and teachers do not use technology as well as kids. Actually it's just the opposite. As long as people find out that technology is useful to them, they will figure out ways to master these tools. For example, you don't have to teach people how to use Facebook, email, or play games.

Kids are technology savvy ONLY to those tools they need to use to pursue their personal interests, so are teachers. In addition to pursuing personal interests, teachers also have to use technology to solve their daily problems (e.g. preparing curriculum and reduce their administrative work load), that's why they rely on productivity tools much more than students.

13. *If you were to do the research again, what would you do differently, if anything?*

I will maybe add open-ended questions to probe students' technology usage inside and outside of schools, other than the options we provided in the survey.

14. *Outside of school students use YouTube the most; in school, they use word processing the most. How does this impact learning?*

Again, they use YouTube for entertainment purpose, or to pursue personal interest (e.g. learn how to do something). YouTube is a great way to facilitate voluntary learning informally. Word processing probably is not the tool with the greatest potential to change students' cognitive skills. It helps them do their work faster than without computers, but it does not make people smarter.

15. *What do we need to do to integrate technology more effectively in the classroom?*

Technology needs to be adopted meaningfully. If teachers do not see the needs they will not change their classroom teaching. When we design the technology integrated activities, they must align with the standards, especially Common Core, to make it easier for teachers to adopt these activities.

16. *What do you believe would be the results of the same research done in other countries...say, European countries or the Far East?*

I believe the result would be similar to our current studies. Our studies mirror the result of a few other studies done before. They all said the same thing, that students, even university students, are not technology savvy than their teachers.

17. *Tell us about the focus groups and the results.*

It is not surprising that teachers and students use a lot less technology inside of school than outside of school. Teachers dominate the decision to use/not use technology in school. That's why we want to do the focus groups to learn why they don't use technology inside of school as much as they do outside of school. The reasons are commonly seen in the literature: lack of resources, lack of time, lack of technology skills or pedagogical practices, and lack of supportive school culture or policies.

18. *Your research indicates most students do not know about Google Earth, Google Spreadsheet and Google Drive...What are your thoughts or insights about this.*

They don't know these tools because they don't use them at home and their teachers don't require the use at school. If you don't see the needs then you don't have the motivation to use a specific tool. These tools are not designed particularly for entertainment; you need to use them to solve particular problems. No wonder rarely do students use these tools.

19. *Teachers report lack of access to technology, lack of time, lack of integration strategies, lack of support and resources due to school policy; how do we address these challenges?*

Lack of access to technology and lack of time, sometimes are just teachers' excuses for not integrating technology in the classrooms. There are plenty of ways to require students to use technology to solve problems even with limited access of resources. You can use the flip classroom concept and have students use technology at home.

Lack of integration strategies and lack of supportive school cultures are much more important issues than the first two. If they do not know how to use Google Earth they will never use them, no matter how many computers they have access to. This can be resolved only through high quality professional development and peer learning/mentoring communities.

As for the change of the school culture, probably it has to be done from the higher level. The superintendent or state department of education level has to reinforce the importance of technology integration, especially from the perspective of college/workforce readiness skills. These kids have to compete with people from all over the world so technology skill is essential. We are obligated to prepare them to have these skills in schools.

20. Technology integration strategies seem to be a problem. Can you give us some examples and some possible solutions?

Following is an example of using technology as cognitive tool:

When teaching the unit of human impact on the living environment, the teacher first provides the class with background information of the content. Next, the teacher facilitates the students to use search engines (e.g. <http://news.google.com>) to look for articles regarding water quality issues and studies in their neighborhood, and have them share their articles with their classmates using a social networking site, such as Edmodo (<http://www.edmodo.com>).

The article research helps students apply what they learn in class to real life experiences, as well as what scientific questions professional scientists are asking today regarding water quality, such as human impact on water quality.

The teacher then provides reliable cyber databases, such as U.S. Geological Survey (USGS), MYSOUND (Monitoring Your Sound), NOAA (National Oceanic and Atmospheric Administration), or Google Public Data Explorer, allowing students to collect public data. With the teacher's guidance, students generate scientific testable questions and hypotheses that can be answered using the data the student collected from the databases. Students also discuss their questions/hypotheses with peers using Edmodo. Sample questions can be: Is the pH level of the water at Location A affected by the surrounding population density? Is the pH level of the water at Location A related to its annual precipitation?

Next, students use a spreadsheet to log and organize their data and create charts to find correlations among factors. Using this information collectively, the student can examine their hypotheses and formulate explanations. If a student does not accept their hypothesis, they will need to research other alternative explanations. Images, videos and hyperlinks can be a part of their report. Credible information should be cited in the report.

Finally, students present their research using Edmodo and share their findings and conclusions with peer classmates. In this example, students need to have technology skills to operate ICTs, cognitive skills to solve problems, and literacy skills to comprehend the subject content.

21) What have we neglected to ask?

I think these questions are very thorough!

CONCLUSION

Dr. Wang has provided a thoughtful analysis of the current situation, delineating the crucial variables and aspects involved in the assessment of the current zeitgeist of students, and the current crop of teachers. Closing the gap between teacher expectations regarding technology and student possession of appropriate, educationally relevant and related skills seems to be on the horizon as a critical need in the realm of education at this time in our nation's growth.