

Who Are We Teaching? The Learning Expectations of “Digital Tribes” in the Classroom

Cameron H. Guthrie

Abstract—Today’s students have grown up with interactive, network based multimedia technologies. They have been labeled the “net generation” and “digital natives” and it is claimed that they learn differently to previous generations. Recent research has questioned the homogeneity of this generation. Our study examined how students in the same classroom differ in their preferences for learning technologies. Using cluster analysis, we find that one class of business school students breaks down into three distinct groups according to their level of use of innovative technologies and their learning styles. Technology matters for some students, but not for all.

Index Terms—Digital natives, learning preferences, net generation.

I. INTRODUCTION

Today’s tertiary students have been exposed to information and networking technologies from an early age. The generation born between 1980 and 1994 has been labeled the “Net generation”, “Generation Y”, “Digital Natives” and the “virtual generation.” Some authors have suggested that these students expect a different learning experience from that of their predecessors.

Recent research has questioned the homogeneity of the net generation [1]. Student behaviors and learning preferences may differ [2]. As evidence against a homogeneous net generation builds, it is useful to take stock of whom, exactly is in our classroom and what do they expect from their learning.

Research to date has focused on differences in levels of digital literacy between and within the same generation. The link to changing expectations in learning technologies has been an implicit one. Yet teachers are more concerned with how students differ in their learning behaviors and expectations in the same classroom.

Our study examines how students in one classroom differ in their expectations from learning technologies. What do they have in common and how do they differ?

II. PREVIOUS RESEARCH

The generation of students born between 1980 and 1994 has been called “Generation Y”, “Digital Natives” and “Net generation”, “Generation M” and the “Echo Boomers” [3]. These categorizations focus on the high exposure that these individuals have had to Internet and digital technologies.

A number of authors have claimed that this generation’s

use of these technologies has influenced how they behave and what they expect from their learning environment. Prosperio and Gioia [4] characterise the “new generation of students as learning in a somewhat different way than the previous verbal or visual generations [...] Students now expect rich, interactive, and even “playful” learning environments.” According to Dede [5] higher education institutions can prosper if they base “their strategic investments on using these emerging educational technologies to match the increasingly ‘neomillennial’ learning styles of their students”, including “mediated immersion” in “distributed-learning communities.”

There has been a call for instructors to modify their teaching practices. Tapscott [6] for example argues that as these students have been raised in a culture of connectivity, redundancy, free information, speed, self-pacing, hyperlinking and interactivity, educators must “abandon their broadcast style and adopt an interactive one ... they need to tailor the style of education to their students individual learning styles” [6].

Recent research however has begun to query the link between exposure to information and communication technologies and learning preferences. Jones and colleagues [7] found that while students engage in a wide range of frequent technology uses, they do not exhibit the desire for participation as predicted by the Net generation literature. In fact, students are relatively passive in their use of technologies, often relying on instructors to provide them with appropriate learning tools.

In a study of Engineering and Social Work university level students, Margaryan, Littlejohn and Vojt [8] found that student attitudes towards learning were mainly influenced by their lecturers and that students generally conformed to traditional pedagogies. In a 2008 survey of 27,317 students at 98 US higher education institutions Caruso and Salaway [9] concluded that that students were not looking for extensive use of information and communication technologies in their courses and that the use such technologies needed to be balanced with other activities, in particular face to face instruction. This result was confirmed in a 2012 follow up survey [10].

The homogeneity of this generation has also been questioned. In a study of first-year University students, Kennedy and colleagues [2] found a common core set of technology based skills “whilst beyond this core there were a diverse range of skills across the student population” (p. 117). Bennett, Maton and Kervin [1] observe that “emerging research challenges notions of a homogenous generation with technical expertise and a distinctive learning style. Instead, it suggests variations and differences within this population, which may be more significant to educators than

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C. H. Guthrie is with the Toulouse Business School, Toulouse, 31068 cedex France (e-mail: c.guthrie@tbs-education.fr).

similarities.”

Experience with information technologies and expectations for learning differ between students of the net generation. Based on survey data from 1222 undergraduate students studying at UK higher education institutions Selwyn [11] found that students’ academic internet use was more dependent on gender and subject under study than technology exposure or expertise. Others highlight the unequal exposure students of the same generation have had to these technologies for socio-economic or cultural reasons [12]. As Bennett, Maton and Kervin [1] note, “it may be that there is as much variation within the digital native generation as between the generations.”

Our study examines how learning preferences differ within one class of students, where exposure to technology and the subject matter under study are the same. We also focus on learning preferences rather than actual use so that students are free to express an ideal state.

III. METHOD

The class under study was a final year Information Systems class in a French business school. All students were born between 1980 and 1994 and belong of the net generation.

The class was made up of a number of French and visiting overseas students. The language of instruction was English. Students follow the majority of classes according to a classical “chalk and talk” approach. Educational technologies are rarely used in the classroom beyond the school’s intranet system. Simulations and business games are used but typically account for credits independently of other subjects. All students have their own laptop computer and all have been trained in using office productivity tools, such as MS Office.

Data was collected through an anonymous online questionnaire. Sixty-two useful responses were collected from 132 students representing a response rate of 47%. The online questionnaire asked a series of questions pertaining to the use of digital goods, online behaviors and learning preferences.

The questionnaire was based on the survey instruments used by [7], [13] and [14] with additional questions added about learning preferences. The first part of the instrument collected background data. The second part then asked students questions pertaining to different areas of their personal and social lives that could be influenced by digital technologies: photos, social networking, telephone, e-mail, television, Web, news gathering, games, music, films and cinema, books and online purchases. The third part of the questionnaire concerned learning preferences. Students were asked 26 questions about how they learn, their use of online resources for studying, and what digital technologies they would like to use in class.

Agglomerative hierarchical clustering was used to identify like groups of students according to their learning preferences. Relationships between clusters and digital behaviors were then tested using non parametric methods. The results are presented below.

IV. RESULTS

We begin the presentation of results by describing the average technological and learning behaviors of the class as a whole. The segmentation of the class according to learning preferences is then presented.

The average age was 21.7 years. Students most often connect to the Internet from home with a moderately fast and reliable connection.

A. Digital Gadgets and Digital Products

Students were asked about ownership and use of digital products, such as digital cameras, mobile phones and MP3 players.

Three in four students own a digital camera. They take an average of 64.3 photos per month, although they rarely print them out nor post them to social networking sites.

Almost all students own a mobile phone. Students make on average 4.3 calls per day and send 12.4 text messages. Apart from communicating, telephones are also used to replace alarm clocks and watches. However they are seldom used to take video, photos or play music and games.

Most students (89%) own an MP3 player although they rarely download music from the Internet and when they do they do not pay for it and seldom share it with others.

B. Online Sharing

All students have a profile on a social networking site, such as Facebook and use it to stay in touch with an average of 301 other members. They connect to the network several times per day. They share a moderate amount of personal information with others and privacy issues on social networking sites are a real concern for them. They only somewhat enjoy sharing information about themselves through these sites.

They intend to use social networking when they leave school and create another separate profile for professional contacts to cultivate a more professional image.

C. Communication Activity

Students find it easy to communicate and make themselves understood using written text. They sometimes need to send an additional message to communicate effectively. They check their e-mail regularly, up to several times per day. They receive four times more e-mail messages (14.3) than they send (3.6).

Some students prefer to communicate personal information through social networking sites, and others through text messaging instead of using e-mail. Only a small share of incoming e-mail is of a private nature.

D. Information Gathering and Trust

Students spend an average of 3.3 hours per day surfing the web. This time has typically replaced time watching the television. Students mainly use the web for amusement (38%), information seeking (32%) and to keep up with the news (25%). Their main source of news is the web (47%), in front of television (24%), paper dailies (16%) and the radio (13%). Students use the web sites of paper journals (68%) and aggregated news sites (ex. Google News) (24%) as their main online source for news and current affairs. They somewhat agree that news items on the Web are reliable

sources of information. They use two or more information sources for important news items.

Students do not use blogs or news widgets as news sources. They sometimes read opinion pieces and comments left by other readers to form an opinion about a news item.

E. E-Commerce

Students rarely make online purchases. When they do, they are looking for lower prices and to save time. The average amount spent is 40.11€ ($\sigma=36.59$). Students trust online retailers with the information they provide online and they generally ignore online advertising. They do not need to first see a product in a real store before purchasing online.

F. Learning Preferences

Students would prefer to watch more instructive video in class. This would help their understanding and make learning more enjoyable. They learn from watching films and documentaries.

Only some class time should be replaced with online classes. Students say they learn best when they work on case studies, and some would prefer to learn through games and simulations. Students mainly use online resources once a course has finished so as to prepare for exams or during the class if the instructor requires it.

Students appear to value class time. Two thirds of students had already followed an online class. They disagree that classes should be entirely replaced with online classes (ex. online video, animations or commented slideshows) although they did agree that around 25% of class time should be replaced with online classes. If classes are not organized online it is because the majority of students would complain and teachers and the school's management would not agree.

Some subjects are more adapted to going online. One in four students responded that more than half of Marketing, Human Resources and Information Systems classes should be taught online. The majority of students do not want any Finance and Accounting classes online.

Students learn best when they work on case studies, but results are mixed when asked whether they would prefer to use games and simulations in class.

These results present an overall view of the class as a whole. Differences between students can be more clearly seen when like students are grouped according to learning preferences.

G. Class Segmentation by Learning Preference

Three clusters populated with 18, 20 and 24 students respectively were identified. The learning profile of each cluster is presented below.

TABLE I: AVERAGE LEARNING PREFERENCES BY CLUSTER
(1: STRONGLY DISAGREE TO 5: STRONGLY AGREE)

Question	Class	1	2	3
I learn from watching documentaries	4.14	3.72	4.25	4.38
Some classes should be replaced with online classes	2.82	2.94	2.00	3.42
Classes are not organized this way because the majority of students would complain.	3.15	3.22	3.95	2.42
I learn best when I work on case studies.	3.77	3.50	3.55	4.17

Students group around three clusters according to their learning preferences. Of the 26 questions used for the clustering, groups of students significantly differ (Kruskal-Wallis χ^2 test, α of 5%) along four quantitative variables concerning learning behaviors and beliefs, their preferences for the substitution of learning technologies for face to face classes in all ten subject areas and five digital behavior variables. The results for each cluster are presented in Table I and Table II below.

TABLE II: AVERAGE DIGITAL BEHAVIORS BY CLUSTER
(1: STRONGLY DISAGREE TO 5: STRONGLY AGREE)

Question	Class	1	2	3
How often do you take photos with your mobile phone?	1.95	2.22	1.55	2.08
How often do you use your telephone to take video?	1.52	1.89	1.05	1.63
How many e-mail messages do you receive per day (on average)?	14.29	12.78	11.05	18.13
I usually share MP3 files that I download from the Internet.	2.45	2.89	1.85	2.63
I usually leave MP3 files that I download from the Internet on my computer.	3.40	4.22	2.65	3.42

Cluster 1 is made up of 11 female and 7 male students. This group of students is the most demanding for a shift away from face to face classes and towards online classes such as online video, animations and commented slideshows. Fig. 1 presents the frequencies observed for this cluster. Darker colors represent a preference for a greater amount of online activity. All students in this group would prefer at least a quarter of the time spent in class should be spent online. Over half of this group would prefer the majority of marketing and human resources classes to be taught online.

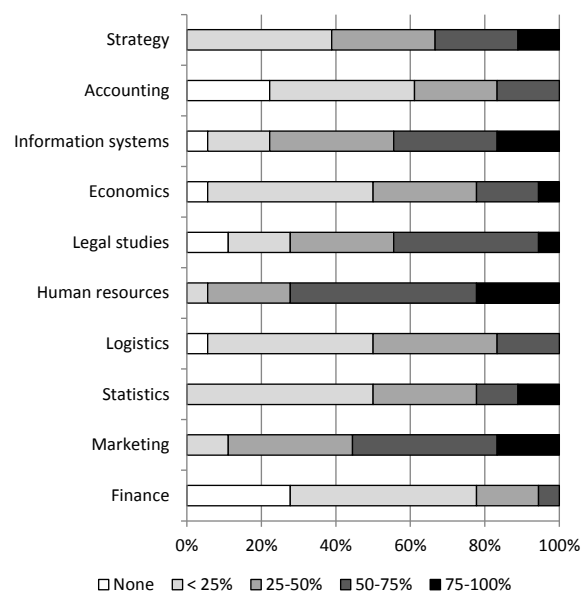


Fig. 1. Cluster 3 "To what extent should online classes be used in the following areas?"

This first group does not exhibit any real differences from the class average along the four learning beliefs variables. These students do not find documentaries as useful as other students for their learning. An examination of the digital behaviors is more revealing. This first cluster is more proactive in its use of mobile phones for taking photos and

video and it's downloading of music files for consumption and sharing. This cluster appears to be drawn by the technology itself towards its greater use in learning activities.

Cluster 2 is made up of 13 female and 7 male students. These students do not agree that face to face classes should be replaced with online classes such as online video, animations or commented slideshows. They believe that if classes are not already organised this way it is because the majority of students would complain. While marketing, human resources, strategy and information systems classes should offer some online classes, all students in this group believe that finance and accounting should be entirely run face to face. Statistics, logistics, legal studies and economics classes should only offer a small proportion of online activities.

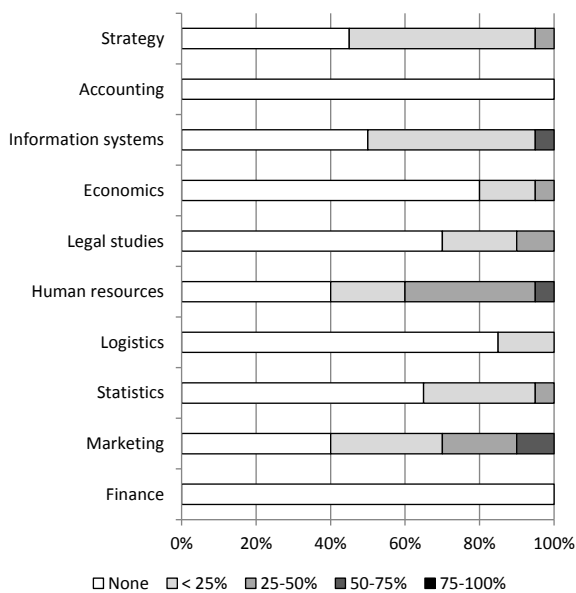


Fig. 2. Cluster 2 "To what extent should online classes be used in the following areas?"

These students use mobile and online music technologies less intensively than students in the other two clusters. They also receive fewer e-mail messages.

Cluster 3 is made up of 11 female and 13 male students. These students believe that a quarter of all classes should be spent online and do not believe that students would complain if these changes were made. This group of students learns best from watching documentaries and working on case studies. While they do report receiving more e-mail than the class average, they otherwise report an average use of digital technologies.

This cluster would appear more balanced than the other two clusters in their learning preferences. While online classes should be substituted for face to face instruction in all subjects, only a small proportion of students would prefer a majority of online classes. Between 38% and 63% of students would prefer a quarter of class time spent in online activities.

V. DISCUSSION

Students demonstrate similar behaviors with regard to the use of digital products and technologies, online communication, sharing and information gathering and e-commerce. This low variability around the use of

networked multimedia technologies confirms previous results [ex. 2] of a core technology set used by students. We also found that students do differ in their use of more advanced functionalities and technologies as reported previously and in particular in their use of mobile technologies and online music files.

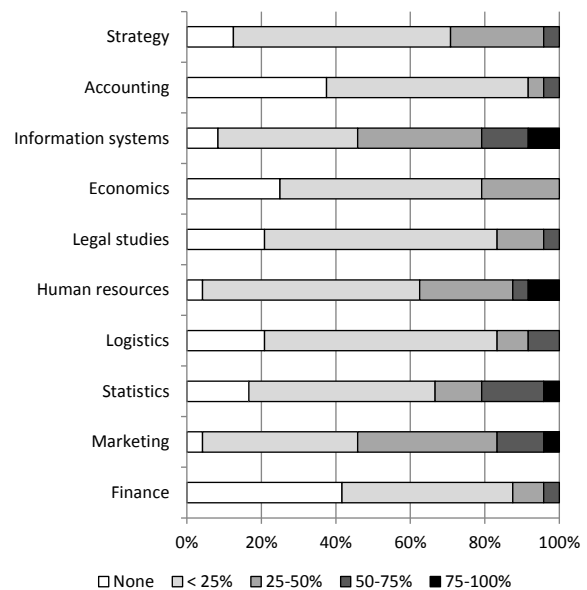


Fig. 3. Cluster 3 "To what extent should online classes be used in the following areas?"

The level of use of more advanced technologies appears to influence the learning preferences for two thirds of students. A first group of students (cluster 1) that reported higher levels of non-standard mobile phone use and online music consumption would prefer more online classes, including instructional video and animations. At the other extreme, a second group of students (cluster 2) that mainly rejects the substitution of online activities for face to face class time report below average use of non-standard mobile phone use and online music consumption and sharing.

However if we look closer at the results for cluster one, we can see that for each subject matter the majority of this group of students never declares a preference for over 50% of online materials. Other factors other than technology obviously come into consideration. As Dahlstrom [10] notes "the voice that emerges here is nuanced and reflective; it is curious about the new but brings a healthy skepticism to the incorporation of au courant technologies into teaching and learning."

Exposure to technology appears to lead some students to expect a greater use of learning technologies. This result partially confirms the Net generation rhetoric that exposure to technology influences learning preferences. Those students that are drawn to more advanced uses of otherwise common technologies are most interested in using more online classes.

One explanation for our results may be different levels of innovativeness in students. According to Rogers [15] diffusion of innovation theory, individuals behave differently when faced with an innovative product, service or idea. In our study, the above average mobile phone and digital music use

of cluster 1 students may make them “innovators,” Innovators are eager to test innovations and are more willing to take risks. Cluster 1 students may be driven by a desire to experiment with online resources. In this same line of thinking, the low use of mobile and digital music technologies by cluster 2 students would categorize them as “late adopters” or even “laggards”, a group more skeptical of an innovation.

This result only holds however for some students in the class. A third group of students (cluster 3) is more balanced and may be drawn to online classes to support an active and reflective approach to learning. This third group notably finds the case study approach and instructional video more useful to their learning than the class average and appears to be less influenced by technology. Some students are driven by an interest in technologies, while others follow learning prerogatives.

Our results are also interesting for different subject matters. Students prefer face to face time in subjects that often involve complex calculations and formulas such as finance, accounting, economics and statistics. In those subjects where there is more time spent analyzing and discussing texts and cases, students would prefer more online activities.

VI. CONCLUSION

Today's graduate students have been exposed to networked multimedia technologies from an early age. Their generation has been labeled the Net generation, the Millennials and Digital Natives. While early research focused on inter-generational differences, recent work has underscored differences between students of the same generation. Our study explored how students differ within the same classroom, studying the same subjects and with the same ICT training and equipment.

Our results contribute to our understanding of student expectations from learning technologies. We found that some students are driven by a desire to explore new technologies while others remain skeptical of them. For two thirds of students in the classroom their relationship with technology in general influences their perceptions of learning technologies. A third group of students appeared more nuanced in their approach looking for a balance in face to face and online instruction to satisfy their personal learning styles. For these students technology was no doubt seen as a means to a learning end.

The challenge now is to design learning environments

adapted to the diverse relationships with technologies that can be found in the cone classroom.

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Cameron H. Guthrie was born in Melbourne, Australia. He graduated from Melbourne University (B. Com Hons) in 1992 and earned a PhD in management science at Université Paris 1 Panthéon Sorbonne, France in 2004.

He is an associate professor at Toulouse Business School in Toulouse France. He has previously published in a number of scholarly journal including the Journal of Entrepreneurship Education and the Journal of Information Systems Education.