



Latour meets the digital natives: What do we really know

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The concept of Digital Natives was first introduced in 2001 and since then has taken a firm hold in both the educational literature and the public consciousness. However the evidence supporting this concept has never been particularly strong. This paper will use the tools of sociology of knowledge particularly those promoted by French sociologist Bruno Latour to attempt to explain how a construct like Digital Natives can become treated as a fact in both disciplinary and public discourse despite the lack of compelling evidence.

The social construction of knowledge

In the mid seventies philosophers of science became interested in the social construction of knowledge (Barnes (1974), Bloor (1976)) which is to say they began to look at what we “know” in terms of how we came to “know” it and trust it and believe in it. Their work revealed that even in areas we perceive as methodologically rigorous “facts” could often come into being as much through social interactions as through production of evidence or thorough testing.

The French sociologist of science Bruno Latour became noted for taking an anthropological/ethnographic approach to studying the construction of facts and knowledge within certain scientific fields. An important aspect of this ethnographic study was tracking the transition of ideas from their initial state which Latour described as speculative to what he described as their point of stabilisation (Latour (1987)). Speculative ideas according to Latour are part of active debates and usually come bundled within strategies designed to justify or validate them usually in the form of statements about them. However once they reach the point of stabilisation ideas cease their dual existence as objects and statements about objects and simply become objects or facts. Once stabilised these “facts” rise above the debate and become the basis for future work or exploration.

Latour identifies a number of processes which facilitate this transition including the idea of “use”. He suggests that the way and idea is used, repeated and cited both in the disciplinary literature and the broader press can add to its credibility and acceptance and eventually contribute to its status as an established fact both through repetition and reinforcement and through the modalities that surround it. Modalities according to Latour are embodied in the context in which an idea is presented and can subtly (and not so subtly) both suggest and contribute to its status. Negative modalities suggest an idea is contested and place it in the context of an ongoing debate. Positive modalities suggest an idea is settled and accepted and place it in the context of an established fact or even assumed knowledge.

The digital natives appear

The idea of Digital Natives as a distinct, identifiable group with recognisable traits and predictable behaviours and preferences first emerged in 2001 Proposed by Marc Prensky in a paper entitled Digital Native, Digital Immigrants he characterised them this way -

Today’s students have not just changed incrementally from those of the past, nor simply changed their slang, clothes, body adornments, or styles, as has happened between generations previously. A really big discontinuity has taken place. One might even call it a “singularity” – an event which changes things so fundamentally that there is absolutely no going back.....

Today’s students – K through college – represent the first generations to grow up with this new technology. They have spent their entire lives surrounded by and using computers,

videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age ...

It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today's students think and process information fundamentally differently from their predecessors ... it is very likely that our students' brains have physically changed – and are different from ours – as a result of how they grew up. (Prensky 2001a, p.1)

As originally presented by Prensky it is what Latour would describe as speculative. However it became an accepted fact (stabilised) in both disciplinary and public discourse remarkably swiftly. This is further surprising given that Prensky bases these assertions on arguments that are a mix of guesswork and flawed logic and provide no real evidence or support for his position (we will return later in the paper to the specific issues with Prensky's original papers).

In light of how little evidence there is in Prensky's papers to support his construct of Digital Natives Latour's ideas about the social construction of facts particularly those concerning use and positive modalities seem helpful in understanding how it became so widely accepted so quickly.

Use in disciplinary discourse

Following Prensky's presentation of the Digital Natives in a two part paper in 2001 (2001a 2001b) this construct was rapidly picked up and used by other authors. If we track the ways in which it was used we can see how it transitioned from one person's speculative idea to a "fact".

Initially when Prensky's work is used it is commented on with full explanation of his position and citation of both papers as in this extract from Van Slyke

In a two-part series entitled "Digital Immigrants, Digital Natives," Marc Prensky (2001a and 2001b) employs an analogy of native speakers and immigrants to describe the generation gap separating today's students (the "digital natives") from their teachers (the "digital immigrants"). The digital natives Prensky describes are surrounded by digital media to such an extent that their very brain structures may be different from those of previous generations (Van Slyke 2003)

Van Slyke even expresses some doubts about the way Prensky characterises the Digital Natives arguing that it is too broad a generalisation.

It seems to me that Prensky overemphasizes the differences between his two groups and de-emphasizes the similarities.Like many observers of other cultures, Prensky overgeneralizes his description of the digital native and then draws dramatic conclusions from those generalizations. (Van Slyke 2003)

It is clear in this article that Prensky's is still a contested idea.

However the citation of Prensky's work rapidly moves to including it in positive modalities that is to say "sentences which lead a statement away from its conditions of production, making it solid enough to render some other consequence necessary" (Latour 1987)

For example Brooks-Young uses Prensky's characterisation of Digital Natives and Digital Immigrants in a mock dictionary definitional format.

dig_i_tal im_mi_grant, n. A technology user, usually over the age of thirty, who was not born into the digital world. The digital immigrant uses technology, but often attempts to bring this use into a framework s/he finds comfort in, such as printing material accessed on the Internet before reading it.

dig_i_tal na_tive, n. A technology user under the age of 30, who was born into the digital world and is accustomed to receiving information very quickly. The digital native is able to parallel-process and multi-task, and usually prefers to see graphics before text. S/he tends to be more comfortable working in a hyperlinked environment, and when s/he receives frequent rewards or feedback ...

Marc Prensky coined the terms digital immigrant and digital native. If you are more than 30 years old, or had little opportunity to use technologies such as personal computers during your own childhood, you are a digital immigrant. (Brooks-Young 2005, p.3)

Likewise Toledo talks about the difference between students and teachers which Prensky was actually arguing for, as a given and Prensky as developing a model to address this established difference.

In 2001, Marc Prensky, a self-admitted guru of game-based education, presented a model addressing the differences between current students and their teachers. Basing his idea on the impact that technology has had on our culture, he suggested two groups: digital natives and digital tourists (Toledo 2006, p.1)

In some papers the positive modalities were even stronger with the Digital Natives being referred to simply as something that always existed and Prensky named or discovered.

Since the 1980s a new breed of student has evolved: the digital native..... These students think and learn differently from their parents and elders. They are plugged in, engaged in the powered up digital world, always connected by the Internet, email, their mobile telephone, and instant messaging they speak another language and inhabit another world from those that have studied before them (Prensky, 2001; Oblinger, 2004) (Robertson 2007, p.2)

Even papers where some doubt is cast on Prensky's work present Digital Natives as an entity with an independent existence which Prensky has named.

These students possess unprecedented levels of skill with information technology; they think about and use technology very differently from earlier student cohorts. They are characterized as preferring teamwork, experiential activities, and the use of technology. Prensky calls them "digital natives," referring to the fact that they have grown up with technology as opposed to "digital immigrants" who did not. 1a,b (Kvavic 2005, p.1)

Kvavic eventually points out that his findings don't necessarily align with Prensky.

We expected to find that Net Generation students would demand greater use of technology in teaching and learning in the classroom. They did not. What we found was a moderate preference for technology. (Kvavic 2005, p.17)

However these later statements do little to diminish the positive modalities embodied in the initial statement the sense is that the Digital Natives exist though their behaviours may not be what we expected.

These positive modalities lead quite quickly to Digital Natives being talked about with no reference whatsoever to Prensky the source of their production no longer considered relevant. Initially this is done with the terms in quotation marks indicating that they are a construct albeit a widely accepted one.

Most students arriving at university this fall are "digital natives" in the sense that they have grown up with computers, software applications, internet access, and related communication tools (Stone et al 2006, p.5)

Soon even the quotation marks go and Digital Natives are presented as background knowledge – something we all know about.

Learning objects are to digital natives as computers are to earlier generations of scholars and practitioners. (Koohang and Harman 2007, p.3)

This is an important step toward what Latour describes as the point of stabilisation. Once there is no longer any sense of an idea having a point of origin it takes on a timeless quality – something we always knew, this brings it much closer to simply being an accepted fact.

Use in public discourse

It is also at this point that Digital Natives start to appear in the broader media and not just disciplinary literature further consolidating their position.

An article in *The Sunday Times* explores the schism between “digital natives”—students who have grown up using an arsenal of high-tech tools—and “digital immigrants”—in other words, everyone else.....

The natives, we’re told, are endlessly devoted to their cellphones, adept at multitasking, and possessed of seemingly short attention spans. (Read 2006)

Report: The next step in brain evolution

Technology is dividing us into digital natives and digital immigrants - and changing the way we think, says Richard Woods

Emily Feld is a native of a new planet. While the 20-year-old university student may appear to live in London, she actually spends much of her time in another galaxy — out there, in the digital universe of websites, e-mails, text messages and mobile phone calls. The behaviour of Feld and her generation, say experts, is being shaped by digital technology as never before, taking her boldly where no generation has gone before. It may even be the next step in evolution, transforming brains and the way we think. (Woods 2006)

Once established as a fact the Digital Natives take on a life of their own becoming the cause of other actions such as staging conferences and establishing international collaborations which further embeds the idea in the discourse making it less and less likely that its status as a fact will be challenged.

Digital Natives in Australia and Korea

Thursday 30th November 2006 Yasuko Hiraoka Myer Room, Sidney Myer Asia Centre, University of Melbourne

The Department of Information Systems at the University of Melbourne, with the support of the Australia-Korea Foundation and Asialink, is hosting a one-day conference for media and ICT experts, academics, students, policymakers and those who are interested in knowing about young people’s digital culture in Korea and Australia. Experts from the two countries will examine how information and communication technologies shape the way young people live and communicate in the two countries and how they produce and consume culture. (Conference website)

What is the Digital Natives project?

An academic research team -- joining people from the Berkman Center for Internet & Society at Harvard Law School and the Research Center for Information Law at the University of St. Gallen in Switzerland -- is hosting and working on the core of this wiki, which illustrates the beginning stages of a larger research project on Digital Natives. (Digital Natives Project Website)

The John W. Kluge Center at the Library of Congress Opens Lecture Series on "Digital Natives"

Young people today born into a digital world are experiencing a far different environment of information-gathering and access to knowledge than a generation ago. Who are these "digital natives" and what are they thinking? How are they using the technology, and are IT experts adequately responding to them?

These questions will be addressed in a new Library of Congress series titled "Digital Natives." The first lecture will explore how young people think, learn and play. (Library of Congress Website)

Alternative explanations

I have thus far been focussing on how the way ideas are used and presented in the literature can be used to explain how the idea of Digital Natives as a distinct and identifiable group became an established fact, but there maybe other ways that the idea became validated and accepted. Obviously if additional evidence was being accrued by independent investigators to reinforce Prensky’s initial assertions then this would go a long way to explaining the consolidation of his ideas and make issues to do with use of much lesser importance.

However I have found little evidence of any independent studies which support Prensky’s position. In later papers there are often references to multiple authors supporting these ideas but most of the

secondary authors are in fact basing their positions on Prensky's original work. Toledo for instance as we have seen cites Prensky she then goes on to cite Brooks-Young as additional evidence for this position.

Brooks-Young (2005) provides definitions of the digital native and the digital immigrant:

dig-i-tal na-tive, n. A technology user under the age of 30, who was born into the digital world" (Digital Immigrants and Digital Natives: What's the Difference? section, ¶ 2).
dig-i-tal im-mi-grant, n. A technology user, usually over the age of thirty, who was not born into the digital world." (Digital Immigrants and Digital Natives: What's the Difference? section, ¶ 1). (Toledo 2006, p.1)

But as we have already seen Brooks-Young derives her definitions from Prensky so while this may be Prensky at one remove Toledo is still effectively citing Prensky twice rather than an independent voice.

The only seemingly independent study which is invoked to support Prensky is the PEW internet study, an extensive study of American college students and their internet behaviours. However while some of the data from this study can and often is used to provide support for Prensky's position (Oblinger and Oblinger (2005)) the authors of the study actually came to very different conclusions to Prensky regarding the coming generation of students and their behaviours.

Today's college students have had long experience with multitasking well before the Internet came into their lives (one can easily imagine them talking on the telephone, watching television, reading a magazine, and having a friend in the room). Students are using such tools as IM clients and email as new media to reproduce the social interaction with which they have had previous experience.

Meeting people in the lab before going elsewhere together, or working on projects at adjoining computers so that social interaction occurs during actual study work, suggests again that the behaviour that students present online is not suddenly a new technique, rather it is a supplementary method to reproduce the kinds of multiple interactions that students performed offline. (PEW Internet and American Life Project 2002)

Put simply whereas Prensky asserts that new technologies have fundamentally changed the Digital Natives altering not only their behaviours but also the structure of their brains, the authors of the PEW study would suggest technology has simply given students new ways to do what they have always done.

Problems with original paper

The other possibility which would render ideas of use unimportant would be if Prensky's initial paper was sufficiently compelling to warrant no disagreement. If the evidence he produced and the argument he built on that evidence was sufficiently watertight then the rapid transition of Digital Natives from a speculative idea to a fact would require no further explanation. I would argue however that this is not the case in fact I would suggest that both Prensky's evidence and his argument are flawed.

I will deal primarily with the second of Prensky's two papers as it is there that he presents the evidence for the claims he makes in his first paper.

In Digital Natives, Digital Immigrants: Part I, I discussed how the differences between our Digital Native students and their Digital Immigrant teachers lie at the root of a great many of today's educational problems. I suggested that Digital Natives' brains are likely physically different.....Here I present evidence for why I think this is so. (Prensky 2001b, p.1)

Prensky's argument has three elements, evidence of young people performing large numbers of technological acts (often repetitively) throughout their lives. Evidence that repetitive acts may effect the neuroplasticity of some organisms humans included. On the basis of these two premises he then concludes that young people doing a lot of repetitive technological acts will have different brains.

I would suggest there are two major flaws in Prensky's case firstly the numbers on which he bases his argument are unfounded estimates and secondly he applies a faulty chain of logic to move from these estimates to his eventual conclusion.

The numbers he presents in the first paragraph of this paper at first glance look quite compelling

Our children today are being socialized in a way that is vastly different from their parents. The numbers are overwhelming: over 10,000 hours playing videogames, over 200,000 emails and instant messages sent and received; over 10,000 hours talking on digital cell phones; over 20,000 hours watching TV (a high percentage fast speed MTV), over 500,000 commercials seen—all before the kids leave college. And, maybe, at the very most, 5,000 hours of book reading. These are today's "Digital Native" students. (Prensky 2001b, p.1)

However when you consult the footnote where the calculations behind these numbers are explained they appear somewhat weaker

1. These numbers are intended purely as "order of magnitude" approximations; they obviously vary widely for individuals. They were arrived at in the following ways (Note: I am very interested in any additional data anyone has on this):

Videogames: Average play time: 1.5 hours/day (Source: "Interactive Videogames, Mediascope, June 1966.) It is likely to be higher five years later, so $1.8 \times 365 \times 15$ years = 9,855 hours.

E-mails and Instant Messages: Average 40 per day $\times 365 \times 15$ years = 219,000. This is not unrealistic even for pre-teens – in just one instant messaging connection there may be over 100 exchanges per day – and most people do multiple connections.

TV: "Television in the Home, 1998: Third Annual Survey of Parent and Children, Annenberg Policy Center, June 22, 1998, gives the number of TV hours watched per day as 2.55. M. Chen, in the Smart Parents Guide to Kid's TV, (1994) gives the number as 4 hours/day. Taking the average, 3.3 hrs/day $\times 365$ days $\times 18$ years = 21,681.

Commercials: There are roughly 18 30-second commercials during a TV hour. 18 commercials/hour $\times 3.3$ hours/day $\times 365$ days $\times 20$ years (infants love commercials) = 433,620. Prensky (2001b, p.8)

The numbers are now "order of magnitude approximations" and the numbers on which they are based seem somewhat arbitrary. The hours of videogame play is taken from a 1996 survey (the 1966 date in the footnote is a typo) and then increased by 20% because "it is likely to be higher 5 years later" and this number is then multiplied by 15 on the assumption that game playing behaviour will remain constant from the ages of 6 to 20. Similarly the number of emails and instant messages is set at 40 a day because "this is not unrealistic" and again multiplied by 15 on the assumption that behaviour does not change as people mature. Interestingly the number of hours of television watched is multiplied by 18 but the number of TV commercials watched is multiplied by 20 so the children in question manage to watch TV commercials for two years before they watch TV an interesting conundrum.

None of this means that Prensky's estimates are necessarily wrong but they are not based on any tangible or testable evidence. Average hours of videogame play could have gone up between 1996 and 2001 but it could just as easily have gone down or stayed constant, similarly teenagers may get 40 emails a day every day of the year every year of their life from the age of 5 but they may get 10 they may get 100 they may get none until in their teens and then get a lot we just don't know and Prensky gives us no actual data to back his numbers.

To compound things we also have a problem with how Prensky extrapolates from these questionable numbers to his eventual conclusion. Prensky pairs the premise that Digital Natives watch a lot of television and play a lot with computers with the premise that doing certain repetitive activities a lot can change an individual's neurophysiology. He illustrates this with the following examples.

- Ferrets' brains were physically rewired, with inputs from the eyes switched to where the hearing nerves went and vice versa. Their brains changed to accommodate the new inputs.

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- Imaging experiments have shown that when blind people learn Braille, "visual" areas of their brains lit up. Similarly, deaf people use their auditory cortex to read signs.

- Scans of brains of people who tapped their fingers in a complicated sequence that they had practiced for weeks showed a larger area of motor cortex becoming activated than when they performed sequences they hadn't practiced. 6
- Japanese subjects were able learn to "reprogram" their circuitry for distinguishing "ra" from "la," a skill they "forget" soon after birth because their language doesn't require it. 7
- Researchers found that an additional language learned later in life goes into a different place in the brain than the language or languages learned as children. 8
- Intensive reading instruction experiments with students aged 10 and up appeared to create lasting chemical changes in key areas of the subjects' brains. 9
- A comparison of musicians versus nonplayers brains via magnetic resonance imaging showed a 5 percent greater volume in the musicians' cerebellums, ascribed to adaptations in the brain's structure resulting from intensive musical training and practice. 10 (Prensky 2001b, p.2)

The trouble is none of these activities seem more than tangentially linked to the activities the Digital Natives are supposedly immersed in. Probably the closest is the changes resulting from tapping fingers in a complicated sequence which could be likened to using a keyboard or other digital device but all this does is cause enlargement in the motor cortex i.e. the area of the brain responsible for tapping fingers. Prensky does not wish to argue that Digital Natives are better at tapping their fingers he wants to argue that they view the world and behave in fundamentally different ways to previous generations. Prensky has arrived at his conclusion from two unrelated premises. To put it simply in a syllogistic fashion he argues:

If you do lots of Type A things your brain will change
 Digital Natives do lots of Type B things
 Therefore their brains will change

Without a clear connection between Type A things and Type B things the conclusion does not follow from the premises. I would therefore claim that Prensky's argument has problems in both the evidence it is based on and the chain of logic it follows and we can better explain the rapidity with which this idea became accepted as fact in terms of the patterns of use and positive modalities which have attended its passage through the literature than through any reference to the compelling nature of Prensky's argument.

Implications

So what does it mean? Should we be researching the coming generation of students to develop a more grounded view of who they are and how they behave? Absolutely and it is reassuring to see that work starting to happen (Kennedy et al 2007).

Should we reject Prensky's work and do away with the concept of Digital Natives completely? Perversely I would have to say no. Latour quoting Kant says "It is not enough to show that something is an illusion we also need to understand why the illusion is necessary." I would argue that the illusion of Digital Natives if not necessary is at least very useful. In the end most discussions of Digital Natives arrive at a description of how they learn and an exhortation for educators and educational institutions to prepare to deal with students who learn this way, the key points of how they learn include:

They construct knowledge
 They learn through interaction
 They are social (learning communities)
 They learn through authentic experience
 They seek relevance

I agree we are indeed facing the imminent arrival of a cohort of students who learn this way but I would argue it is not because they are Digital Natives but because they are human beings. This is how humans learn, by constructing knowledge through authentic experiences in social situations, this is how humans have always learnt. Educators have been promoting these ideas for decades with varying degrees of success. If it takes the illusion of Digital Natives to convince people of this and to promote the development of learning environments that acknowledge and utilise this then I would consider that a powerful and useful illusion indeed.

So if it is a helpful illusion why deconstruct it at all why not simply let sleeping dogs lie? The answer is that while the illusion is helpful if we accept it unquestioningly it may also be dangerous. By placing the emphasis on supposed difference and by making technology the source of this difference Prensky focuses

us on technology as the answer and technology is not the answer. The answer is to design learning environments which will engage learners who construct knowledge, learn in communities and seek relevance. Technology is as always just one of many tools we can use to achieve this. If we lose sight of this and focus unduly on technology we will create more problems than we solve.

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