

Adding ‘Pull’ to ‘Push’ Education in the Context of Neomillennial E-learning: *YouTube* and the Case of “Diagnosis Wenckebach”

Julie Willems

Introduction

Electronic learning (e-learning) is now a global phenomenon, with institutions competing for market share. E-learning is defined by Meredith and Burkle as “learning facilitated by internet and www technologies, delivered by way of end-user computing, that creates connectivity between people and information, and creates opportunities for social learning approaches.”¹ This shift towards e-learning provides an alternative to, or augments, traditional face-to-face academic environments and text-based correspondence-style distance education.

In this era of worldwide competition, transformations in pedagogy are currently taking place as a result of the exponential popularity of the so-called social-sharing software of Web 2.0. More traditional ‘push’ approaches to education are being challenged by so-called ‘pull’ approaches of educational content co-created by students as prosumers. This paper explores ‘push’ and ‘pull’ educational pedagogies, exploring the promises and pitfalls of incorporating socially-shared streamed video clips on *YouTube* in formal education contexts. It then explores the *YouTube* “sensation”,² “Diagnosis Wenckebach”, as an example of the addition of ‘pull’ to ‘push’ education in neomillennial learning.

Neomillennials, Web 2.0, and the transformation of formal education

Neomillennials

The active participants of our 24/7 wired world have been labelled as “neomillennials”.³ Sankey defines neomillennials in terms of learning modalities, with ‘neo’ meaning ‘new’, ‘millennial’ referring to the learning modality required for the new millennium.⁴ Communicational practices for neomillennials are multimodal. Multimodal communication incorporates multiple modes of communication:

Literally, ‘multi’ refers to ‘more than one’ and the term ‘modal’ may cover the notion of ‘modality’ as well as that of ‘mode’. Modality refers to the type of communication channel used to convey or acquire information. It also covers the way an idea is expressed or perceived, or the manner an action is performed. Mode refers to a state that determines the way information is interpreted to extract or convey meaning.⁵

Neomillennial learners are also multiliterate, that is, they are able to fluently communicate with these multiple communicational modes and not simply be literate in one mode of communication, such as with text.⁶ Kress writes:

Modes of communication, other than language, are becoming increasingly prominent and even dominant in main areas of public communication in which language was formerly used exclusively or dominantly. This is true of visual images in particular. We are, it seems, entering a new age of the image, a new age of hieroglyphics; and our [education] system is not prepared for this in any way at all.⁷

Communication in e-learning environments constitutes a qualitative change in the way the neomillennial society is managing communicational interactions.⁸ George further explains that:

For students who have grown up in a technology-saturated and an image-rich culture, questions of communication and composition will absolutely include the visual, not as attendant to the verbal but as complex communication intricately related to the world around them.⁹

Modern technologies, according to Jewitt, “make a wide repertoire of representational and communicational modes available”,¹⁰ and these in-

clude images, colour and movement, music, and sound-effects, in addition to speech and writing. We are in a time of change in communicational practices that are also driving changes in educational practices.

Dede writes that neomillennials “seek distributed learning situations that interweave face-to-face interactions with communication and shared experiences across distance and time.”¹¹ Communication for neomillennials often occurs in virtual spaces not necessarily bounded by a “co-presence in a physical space”.¹² Neomillennials are ‘glocal’ – that is, they are simultaneously global and local – and concurrently both cultural and intercultural. The term glocal was apparently first popularised by Lange in 1990 when he suggested the interplay between local-regional-global interactions.¹³ With the further development of the term glocal, Wellman has specifically employed it in relation to the overlapping spheres of society, technology and the World Wide Web(WWW).¹⁴ Pottruck and Pearce write:

The growing global market in information has driven advancements in technology so powerful that the traditional barriers of time, distance, and form are now transcended by universal, ubiquitous connectivity and international protocols ... Technological doors have opened wide to a new global, electronic community.¹⁵

With this global electronic community comes economic opportunity for institutions of higher learning to compete for market share beyond their local or regional boundaries through the provision of e-learning in formal education. Yet glocalisation of education can serve to perpetuate the status quo. Quoting Giddens,¹⁶ Anderson writes that e-learning can work as a prime device of modernisation to disembed the local interactions of social relations and lift these across time and space.¹⁷

Nilan has argued that many students find what they encounter in formal academic contexts nothing to do with their real lives, which is involved with the exciting and compelling domain of electronic mediums that are part of everyday popular culture.¹⁸ She writes:

unlike the forms of knowledge offered and validated by [formal education providers], which are usually seen as ‘belonging’ to somebody else (the teachers), young people see popular culture as belonging to them. This makes them experts. The sharing and enriching of the domain of their ‘own’ knowledge is a pleasurable and powerful exercise. For many students such knowledgeable talk provides a counterweight to the negative feelings of ignorance, incompetence and boredom they experience in relation to the formal academic curriculum.¹⁹

Social-sharing and Web 2.0

The World Wide Web (WWW) is an evolving structure. The earlier variant of the Web was a means by which different modes of information could be found, downloaded, saved and/or printed.²⁰ It was predominantly static in terms of what could be done with the material contained, and as an outcome, has been dubbed the 'read-only web' or 'Web 1.0'. In formal educational applications, content on Web 1.0 was that which was published online by those who had authority and access. O'Reilly remarks that Web 1.0 content was published for consumption, whereas today, content has become the point of participation.²¹

The term Web 2.0 was coined by O'Reilly²² to reflect the advances in the WWW from the predominantly 'read only' technology of the Web's infancy in the mid 1990s, to the 'read-write web' of today.²³ Khan²⁴ writes that as a result of the Web's increasingly improved interpersonal collaborative characteristics – a signifying factor of Web 2.0 – a huge social phenomenon has occurred and this has implications for the construction of formal learning environments, offering more opportunities for learners to learn, provided that they can maintain access.²⁵ ²⁶ Equity and access issues aside, the combination of digital technologies, the computer and the WWW provide the so-called 'clicks and mortar' alternative to the traditional on-campus, face-to-face academic experience ('bricks and mortar').²⁷

Duffy suggests that there are four key aspects that delineate Web 2.0 from other Web conceptualisations.²⁸ These are:

- the delivery of applications entirely through an internet browser;
- users own the content on a site and exercise control over it;
- through participation, users are encouraged to contribute to a rich, interactive, user-friendly interface; and
- it contains social-networking functions.

Dede has argued that the combination of the technologies of Web 2.0, multiuser virtual environments, and wireless mobile technologies has given rise to new learning styles that he terms "neomillennial learning styles".²⁹ He identifies five factors in neomillennial learning styles and these are fluency in multiple media; communal learning; expression through non-linear associational webs; co-design of learning experiences; and a balance between experiential learning, guided mentoring and collective reflection.³⁰ Uniquely, the preferred learning environments of neomillennials involve multimedia, active learning, participation in communal learning experiences, and the co-design of those learning experiences.³¹

The popularity of neomillennial media has potential for human agency. Human agency is defined by Allen as the "capacity of individuals and groups to act independently of the constraints of social structure and to al-

ter their social worlds.”³² Downes argues that the power of Web 2.0 is that it is:

a social revolution ... Web 2.0 is an attitude not a technology. It's about enabling and encouraging participation through open applications and services. By open I mean technically open ... but also, more importantly, socially open, with rights granted to use content in new and exciting ways.³³

This second generation web contains many social-sharing applications. Bartlett-Bragg notes that this is characterised by media which “augments group interactions and shared spaces for collaboration, social connections, and aggregates information exchanges in a Web-based environment.”³⁴

In these social-sharing environments, it is possible for participants to move beyond being simply observers or readers. They are instead creators of content, or co-creators. Kommers argues that in conjunction with Web 2.0, there is a shift from intrapersonal expertise to interpersonal expertise.³⁵ Web 2.0 is centred around “collaborative and open learning techniques, where learners are not in the end of the learning chain, they actively participate in the learning process as authors, co-authors and contributors of knowledge, whose products are based on collaborative intelligence.”³⁶

Pedagogies and ‘push’/‘pull’ education in the new millennium

Web 2.0 is the backdrop against which various pedagogies and consequent practices coexist in neomillennial environments. These include the broad theories of behaviourism, cognitivism, constructivism, and connectivism. Ertmer and Newby’s insightful comparison between behaviourism, cognitivism and constructivism from the perspective of instructional design provides a useful starting point for this discussion.³⁷

Behaviourism

Behaviourist approaches to e-learning design are based on an underlying principal that learning results in observable changes in behaviour “in either the form or frequency of observable performance” as the result of a learnt response to a given stimulus.³⁸ Further, behaviourists believe learning is improved by the addition of selective reinforcement or rewards for the correct consequential behaviour following the stimulus, for example, test accuracy on a list of items recalled after a period of rote memorisation.³⁹

The role of the teacher, according to a behaviourist standpoint, is to provide the materials deemed necessary for learning to take place, whereas the learner is viewed to being “reactive to conditions in the environment”.⁴⁰ In other words, learning is the result of conditions in the environment that are external to the individual learner.

One consequence of behaviourist approaches to e-learning design is the belief that the supply of information, of educational content, will result in deep learning. Yet this is questioned: many argue that behaviourist approaches to education lead only to surface approaches to learning.⁴¹ Laurillard has argued that in many formal educational contexts of higher education, the dominant practice of teaching consists of lectures and tutorials.⁴² Phillips contends that these approaches tend to view teaching as the transmission of content.⁴³ Reeves maintains that this traditional practice is based on the pedagogical philosophy of instructivism, a derivation of objectivist epistemology, viewing the learner as an “empty vessel”.⁴⁴ Jonassen writes:

Objectivists believe that learning is externally mediated by the instructional strategies that predetermine the required mental activities ... Perhaps the most common conception of instruction based upon objectivist thinking is the ‘transmission of knowledge’.⁴⁵

For Sheely, the move of formal education from place to space has in many instances simply been the transference of historic academic traditions into e-learning environments, such as the lecture and text, and along with this, the accompanying educational pedagogies that view learning as the transfer of knowledge.⁴⁶

Cognitivism

Cognitivist approaches share some similarities with behaviourism. Both behaviourist and cognitivist approaches to defining learning are based on a belief that external environmental conditions play a role in learning: “both the behavioural and cognitive theories are primarily objectivistic; that is: the world is real, external to the learner”.⁴⁷ Yet there are differences between their viewpoints on learning. Cognitivists “de-emphasize a concern with overt, observable behaviour and stress...instead more complex cognitive processes.”⁴⁸ Additionally, whereas learning requires selective rewards for correct responses for behaviourists, for cognitivists, learning requires the careful mental organisation of new information and making that new information meaningful which in turn is reinforced by feedback.⁴⁹

For cognitivists, what happens in the mind is an internal replication of the objective external ‘real’ world.⁵⁰ The role of the teacher, according to a

cognitivist standpoint, is similar to the view of behaviourists: to provide mental organisation to materials deemed necessary for learning to take place. Jonassen writes: “both behavioral and cognitive conceptions of instruction seek to analyze, decompose, and simplify tasks in order to make instruction – and by inference, learning – easier and more efficient.”⁵¹ With such a perspective, a learner’s role is still one of semi-passivity.

Constructivism

Whereas behaviourists view learning as that which has an observable or measurable outcome, and cognitivists view learning as that which takes place in a learner’s mind, constructivists view learning as that which occurs within social networks. In addition, whereas behaviourists and cognitivists see the learner as reactive, constructivists view the learner as needing to be an active participant in their learning process as learning is an “internally mediated reality”.⁵² Indeed, it is the interaction between the external environment of the learner and their personal interactions and experiences which are necessary for meaningful (deep) learning to take place.⁵³

Constructivists believe that effective learning must take place in realistic settings and that any learning tasks need to “be relevant to the students’ lived experience”.⁵⁴ It is this aspect that is the foundation for the constructivists’ belief that in order “[t]o be successful, meaningful, and lasting, learning must include [three] crucial facets: activity (practice), concept (knowledge), and culture (context).”⁵⁵ The role of the educator is a guide to the learner, encouraging them to:

construct their own understandings and then to validate, through social negotiation, these new perspectives. Content is not pre-specified; information from many sources is essential.⁵⁶

Ertmer and Newby argue that the behaviourist, cognitivist, and constructivist approaches are useful for different aspects of knowledge development on a learning continuum.⁵⁷ They argue that behavioural approaches to learning design can provide the content knowledge (the knowing what) and is best for situations where the learner has a low level of beginning knowledge; that cognitivist approaches are good for problem-solving (the knowing how); and that constructivist approaches are good for understanding how to deal with complex issues (reflection-in-action) and this approach is best when high level processing tasks are required.

Connectivism

Siemens argues that while behaviourism, cognitivism and constructiv-

ism are the pedagogical bases most-often utilised in the creation of e-learning environments, they were developed in a time before learning was impacted by the technology that has changed how we live, communicate and learn.⁵⁸ As an alternative, Siemens has proposed the learning theory of connectivism as a more appropriate learning theory for the wired 24/7 learning spaces of the new millennium.⁵⁹ Siemens argues that connectivism is a synthesis of chaos theory, network theory, complexity theory and self-organisation theory.

Meaning-making for connectivists comes through a learner making connections “between specialized communities and information/knowledge architectures”.⁶⁰ Bartlett-Bragg writes that “[t]he social structure of the environment [comprises] an infinite variety of people, both readers and writers, supporting the structure of network evolution that develops through an ecology of links and connections.”⁶¹ According to Siemens, connectivism “recognize[s] both the impact of new learning tools and the environmental changes in what it means to learn” in the era of digital technology.⁶²

Thus learning, from a connectivist stance, is viewed as both something which takes place within an individual *and* is impacted by the external environment of that individual. It is “actionable knowledge” which “is focused on connecting specialized information sets, and the connections that enable us to learn more are important than our current state of knowing.”⁶³

‘Push’ and ‘pull’ education

Writing specifically from a business perspective, Hagel argues that institutions have been perfecting highly efficient ways to distribute resources over the past century. This relates to ‘pushing’ what business anticipates the needs of the consumer to be. In educational contexts, this means ‘pushing’ onto students the resources deemed necessary for effective learning to take place: “[i]n education, we design standard curricula to expose students to codified information in a predetermined sequence of experiences.”⁶⁴

Like many educational formats before the advent of Web 2.0, Richardson suggests that ‘push’ educational models are those in which students are often considered as passive receivers of information, and their needs may be preconceived by those controlling the decision-making of shaping the learning environment and its content(s).⁶⁵ Grinnell argues that this:

‘push’ model of instructional delivery is still in play, and ... the traditional teacher-centered information transfer paradigm remains entrenched, similar to the prevailing information-transfer paradigm where teachers transfer ‘knowledge’ to often passive, unengaged

students.⁶⁶

Moreover, Arif et al. argue that the 'push' educational models tend to promote a "one-size-fits all" approach to teaching and learning.⁶⁷ While expeditious, they might not be the best model for student retention.⁶⁸

In contrast, 'pull' connotes a demand-style operation in which the consumer (or student) demands, requests or creates the particular products or information that they require. Hagel writes that 'pull' approaches create "platforms that help people reach out, find and access appropriate resources when the need arises".⁶⁹ In educational contexts, this approach is often associated with the provision of student-centred learning opportunities. Richardson suggests that 'pull' educational models are those which "treat students as networked co-creators of media and are designed to accelerate capability building, helping students learn as well as innovate, by pursuing trajectories of learning that are tailored to their specific needs."⁷⁰

'Push' education is more aligned with the application of behaviourist and cognitivist pedagogies in Web 2.0 e-learning environments, whereas 'pull' education is more aligned with constructivist and connectivist approaches. There is a place for both in providing balanced learning environments.⁷¹ However, adding 'pull' to 'push' educational opportunities for demand-driven, student-centred higher education cannot be purely for the sake of it. It needs to have educational value, something that will add to the depth of the learners' knowledge as an outcome.

Web 2.0 offers a new kind of participatory medium in which social networking sites such as *YouTube*, *FaceBook*, *MySpace* and *Twitter* allow individuals to virtually congregate, view, create, and share information beyond the confines of being present in the same physical space. Grinnell writes that "Web 2.0's applications and platforms allow us to build communities of learners in which knowledge is constructed through conversation and interaction between all participants".⁷² In these virtual spaces individuals are simultaneously consumers and producers: a situation suggested by McLuhan and Nevitt almost four decades ago.⁷³ Toffler later coined the term 'prosumer' to describe this synthesis of roles between consumer and producer.⁷⁴ In an educational context, accepting the shift of student roles from consumer to prosumer is aligned with pedagogies of student-centred learning, which in turn is premised on the notion that students take an active role in their learning alongside their educators. Grinnell remarks that as participatory prosumers, "consumers and producers of information and knowledge share the stage as equals" with their educational guides.⁷⁵ However, Bruns has recently argued that Toffler's term 'prosumer' is embedded in the specific historical context of a mass media age that does not

fully explain the experiences of neomillennials.⁷⁶ He argues that the term “prosumer is clearly not the self-motivated creative originator and developer of new content which can today be observed in projects ranging from open source software through Wikipedia to Second Life”.⁷⁷ Rather, Bruns suggests that with the rise of the social-sharing nature of Web 2.0, a further shift has taken place and coins the new synthesis “produser”. He explains:

[i]n the user communities participating in such forms of content creation, roles as consumers and users have long begun to be inextricably interwoven with those as producer and creator: users are...also able to be producers of the shared information collection, regardless of whether they are aware of that fact - they have taken on a new, hybrid role.⁷⁸

From a business perspective, the interface between ‘push’ and ‘pull’ approaches is termed the ‘decoupling point’ or ‘push-pull interface’. This is the point of balance between mass production to mass customisation. Transferring Toffler’s predictions to the realm of higher education, in order to maintain profitability and promote institutional growth, institutions (and therefore academics) need to consider a shift away from the mass *production* of educational products towards mass *customisation*.⁷⁹ This sentiment has recently been echoed in an Australian context with the Deputy Prime Minister, the Honourable Julia Gillard M.P., stating that reforms of the Australian higher education sector will be premised on a student-centred, demand-driven higher education system.⁸⁰ Grinnell argues that while this

demand-pull approach might appear to be extremely resource-intensive[, the] vast and cost-effective platforms [of Web 2.0] provide support for multiple learning styles and personal(ized) learning spaces.⁸¹

YouTube is one such potential learning space.

YouTube

Created in 2005 in California by Steve Chen and Chad Hurley,⁸² *YouTube*⁸³ is a popular free website that streams multimedia clips.⁸⁴ Beyond the provision of free video streaming, users can upload, view, and share video clips. It is also a social networking space in which participants can make comments and debate opinions. Like other Web 2.0 applications, it is an example a social medium that encourages the building of “communities of learners in which knowledge is constructed through conversation and interaction between all participants”.⁸⁵

Duffy argues that like other Web 2.0 technologies, *YouTube* makes new demands on learning and provides new supports for learning even though simultaneously dismantling some of the educational traditions of the past.⁸⁶ Used in conjunction with other forms of educational instruction that are aligned with more traditional 'push' modes of education, *YouTube*, Burden and Atkinson argue, "can be used as hooks to engage learners in high level thinking skills, including critical thinking".⁸⁷

However, careful consideration of the promises and pitfalls are required to obtain a balanced understanding before incorporating *YouTube* into any formal educational environment – from either a 'push' or a 'pull' perspective.

Benefits of using videos from YouTube in formal education

There is a growing support for the benefits of *YouTube* as an adjunct to other forms of instruction in formal learning environments. Quoted by Duffy⁸⁸, Misanchuk et al. have argued that video has benefits over text and static graphics as videos involve movement and the observation of space and the passing of time, which moreover can be paused and reviewed.⁸⁹ These authors argue that such aspects help enhance learning.

Duffy argues that videos are "a means toward achieving learning goals and objectives",⁹⁰ and concludes that video streaming is "an effective catalyst and facilitator for ... discourse and analysis".⁹¹ Similarly, Conway argues that materials on *YouTube* "can enrich the learning experience of college students by providing video realia to accompany their textbooks, in-class documentaries and course lectures."⁹² For others, *YouTube* can be used to capture the nuances of a workplace.⁹³

Beyond directed learning, the use of video as a means of student self-expression and peer teaching is quite powerful. The social-sharing nature of the medium invokes an active involvement of the viewers in ways that the video-watching in earlier decades did not. In *YouTube*, viewers can leave qualitative responses through video rating systems, and qualitative comments through either multimedia (sharing in turn a video) or via text (in the text comment option). Further, they can in turn share the particular video with others in other social-sharing mediums of Web 2.0, such as *Facebook*, *Twitter* and *MySpace*.

YouTube is thus media which is worth consideration as one of the tools in a kit of approaches in formal education. Cann notes that the:

runaway success of 'viral' video sites such as *YouTube* provides a model for high levels of penetration into student populations which cannot be ignored in the design of learning materials, but consider-

able further research is necessary to determine both the effectiveness of these new formats.⁹⁴

Pitfalls of using videos from YouTube in formal education

While *YouTube* can be a conduit for peer-teaching through information creation and co-creation, it is not devoid of challenges. Notes of caution are necessary in suggesting this medium as a potential supplement in formal education in the new millennium. There are a number of pitfalls in using video to supplement formal education, particularly those that can be found on *YouTube*, and these pitfalls relate to issues surrounding appropriate content, accuracy of information, ethico-legal considerations, equity issues and individual learner considerations, organisational barriers, issues relating to intellectual property, and pedagogical considerations.

The first challenge is guidance in relation to *YouTube*'s content matter. While not necessarily an issue for adult learners, the content on *YouTube* can be inappropriate for younger students. Dawson blogs that he initially had banned *YouTube* from his list of students' potential learning sites "not because it's inherently a bad place to hang out, but because there is plenty of content that simply isn't appropriate" for younger students.⁹⁵ He now suggests teacher judgement on what is acceptable viewing for younger students. Duffy has similarly advised educators to check the suitability of content for any videoclip that they recommend.⁹⁶

A associated issue relates to precision of information. Scholars urge caution over the accuracy of information that can be found on popular sites on the WWW. Keelan et al. note that "professionals have expressed concerns about the quality and veracity of information individuals receive from Internet-based sources."⁹⁷ In their study on the impact of *YouTube* on educating the public on aspects of health, specifically immunisation, they found that "Clinicians therefore need to be aware of Internet video-sharing sites and should be prepared to respond to patients who obtain their health information from these sources."⁹⁸ However the authors also acknowledge that despite this challenge, "[t]he potential use of these sites for effective communication by health professionals should also be considered."⁹⁹

One example which summarises both the inclusion of harmful and/or misleading content and its relationship to ethico-legal considerations in student video productions on *YouTube* is the case of the recent clip produced by a group of students enrolled at a particular secondary college in Melbourne, Victoria. This video, shared on *YouTube*, extolled the virtues of taking the drug ecstasy and suggested ways in which the drug may be safely consumed. In newspaper coverage of the case, Holland cites Paul Dillon, from *Drug and Alcohol Research and Training Australia*, as saying:

This concept of how to take a drug safely is mythology. It's fraught with danger. This is one of the problems we have with YouTube.¹⁰⁰

As a result, the clip has been removed from the *YouTube* site, and the students concerned in the production of the video have been required to undergo compulsory counselling in relation to both drug use, and responsible behaviour in, and appropriate content of, online videos.

The fourth issue relates to equity and access issues for learners. Bartlett-Bragg terms these “personal inhibitors” to social-sharing educational possibilities.¹⁰¹ Dawson has noted that the streaming video of *YouTube* eats up bandwidth, and notices that when groups of students are accessing *YouTube* simultaneously in a given physical location, this can take a toll on limiting available bandwidth for other purposes.¹⁰² The same was recently noticed at an academic conference when groups of educators simultaneously tried to access *SecondLife* in a computer lab context, bringing the system to its knees.¹⁰³ Further, Bartlett-Bragg has underscored the impact that an individual learner’s computer literacy and information literacy can have on successful learning outcomes in social-sharing environments.¹⁰⁴ Personal time restrictions or the availability of others may also limit the potential for relatively swift communal dialogue to take place. Other issues relating to individuals include their desire or motivation to learning.

Bartlett-Bragg notes potential disadvantages in promoting social-sharing that relate to several organisational inhibitors.¹⁰⁵ The issue of fire-wall protection that may be in place to protect the organisation from potential harm could prevent access to social-sharing sites. Organisational technology managers may have protocols in place that discourage media-rich environments such as videos and encourage text-only environments, in turn limiting pedagogical possibilities for educators and learners. Further, if media-rich and/or social-sharing options are available, organisational managers might call into question whether the learning that takes place in such environments can be directly or quantitatively measured in terms of being effective, and therefore justified.

A sixth and growing issue for sharing content on social media sites such as *YouTube* is the issue of intellectual property. While the *YouTube* site specifically states: “Respect copyright. Only upload videos that you made or that you are permitted to use. This means don't upload videos you didn't make, or use content in your videos that someone else owns the copyright to, such as music tracks, snippets of copyrighted programs, or videos made by other users, without necessary permissions”.¹⁰⁶ Infringing copyright through user generated content (UGC) may be deliberate or unwitting (direct infringement, contributory infringement, and vicarious infringement).¹⁰⁷ *YouTube*, as an organisation, has been the focus of law

suits attributing blame for breach of copyright to the organisation rather than the individual sharing the content.

A seventh concern is articulated by Duffy, is that the integration of videos in formal education should not be passive activity, nor simply entertainment.¹⁰⁸ The pedagogy behind using videos in neomillennial learning environments thus needs to be considered. The author lists strategies to enhance deeper learning and the engagement of learners.¹⁰⁹ These include to segment the video in short intervals; ask students to take notes; to pause the video to predict what will happen next; turn the video sound off and self-narrate; turn the picture off, but not the sound; give the students a specific focus to consider while viewing; have a group debrief following the viewing to discuss or blog their reactions to the material contained within the videoclip; and the integration of the video into the overall learning experience to promote deep learning. Further, Bartlett-Bragg argues that while critics have pointed to the challenges experienced within social-sharing environments of Web 2.0 and attributed them to the functionality and/or the choice of social-sharing software, that few have evaluated the results from the perspective of organisational or pedagogical inhibitors.¹¹⁰

YouTube offers a medium through which both 'push' and 'pull' educational possibilities can be explored. Alternatively, it can be used as an avenue for student-created, customised resources to accompany other educational resources. If the noted concerns over the use of videoclips streamed on *YouTube* can be factored into the addition of these to formal neomillennial learning environments, then the potential for student-centred learning is great.

Case Study: Second Degree AV Block and “Diagnosis Wenckebach”

An example of student-centred learning is the case study of “Diagnosis Wenckebach”. This case study highlights the possibilities for incorporating 'push' educational opportunities alongside more traditional, instructional 'pull' learning scenarios to engage learners in the new millennium. It is an example of peer-teaching and learning through the utilisation of popular media that are part of Web 2.0. It also emphasises the potency of the creation or co-creation opportunities that these technologies can provide for student-centred pedagogies and for deep learning.

Explanatory Preamble on Wenckebach's Phenomenon: A 'Push' Approach to Teaching

The heart is a muscular organ which is divided into four chambers: two upper atriums (right and left) and two lower ventricles (right and left). The atriums function as receiving chambers for blood, whilst the ventricles act as ejecting chambers for the circulation of blood.¹¹¹ The contraction and relaxation of the heart muscle, necessary for the circulation of blood around the body, is controlled by electrical impulses within the myocardium (heart muscle). The main pacemaker for these electrical impulses is the sinoatrial (SA) node, which is located in the right atrium of the heart. The electrical impulses emanating from the SA node travel down pathways of specialised tissue in the myocardium to the atrioventricular (AV) node, located between the atria and ventricles, allowing the chambers of the heart to expand and contract (and hence enabling blood to pump around the body). The AV node “contains delay tissue to allow for atrial contraction to eject the blood from the atrium into the ventricles before ventricular contraction.”¹¹² In a normal electrical impulse, this delay from the AV to the SA node is less than 0.20 seconds.¹¹³

Usually there are no disturbances of the rhythmic electrical impulse conduction between the SA node and the AV node, leading in turn to a regular heartbeat of 60 to 100 beats per minute. This regular heartbeat is labelled ‘sinus rhythm’. On electrocardiogram, sinus rhythm has a particular appearance of regular intervals, with a *P* wave, a *QRS* complex, and a *T* wave visibly present (Figure 1).

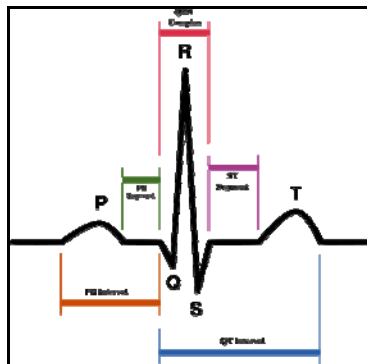


Figure 1: Components of an electrocardiogram¹¹⁴

There are however, times when the rhythm of the heart is not regular, leading to the range of conditions known as arrhythmias, literally meaning, without rhythm.¹¹⁵ Two major types of arrhythmias arise in the AV node, and one of these is atrioventricular block. Atrioventricular block (hereafter AV block) is a medical condition resulting from a slowing or blockage in

electrical conduction system between the AV node and the ventricles. There are three 'degrees' of atrioventricular block, ranging from first degree block in which electrical impulses are slowed (the least serious); through to third degree block, or complete heart block, which is the most serious. There are two distinct sub-types of second degree AV block: Type 1 (AV Type 1 Mobitz) and Type 2 (AV Type 2 Mobitz).

On electrocardiographs (ECG's), AV Type 1 Mobitz shows up as a slowing of electrical impulses and 'dropped' beats.¹¹⁶ This typically presents itself as progressive elongations of the *PR* interval on consecutive beats, followed by a blocked *P* wave (or a 'dropped' *QRS* complex). After the dropped *QRS* complex, the *PR* interval resets and the cycle repeats (Figure 2).

AV type 1 Mobitz is also known as Wenckebach's phenomenon, named after Dutch anatomist and cardiologist, Karel Frederik Wenckebach, who recorded valuable insights into atrioventricular conduction within the heart, and who is considered as a forefather of modern cardiology.¹¹⁷ It was also Wenckebach who noted that after giving patients 1gm of quinidine, sinus rhythm was restored.¹¹⁸ Quinidine is a pharmaceutical which acts to increase the conduction of electrical impulses through the AV node as heart rates drop.¹¹⁹ In more recent times, the drug atropine has been commonly used in the treatment of Wenckebach's phenomenon.¹²⁰

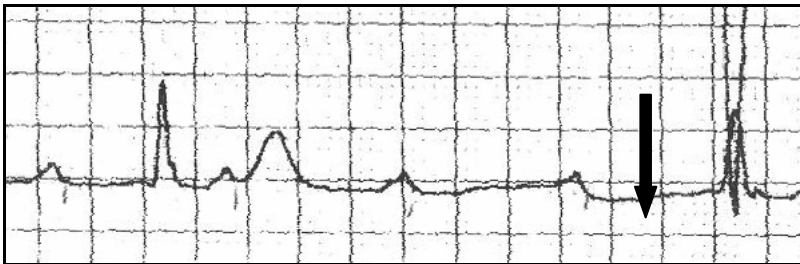


Figure 2: ECG tracing showing AV Type 1 Mobitz (Wenckebach's phenomenon)¹²²

While useful as a means of delivering new information to learners, this example of transmission of informational content illustrates the 'push' education that Richardson has described. In this explanation of cardiac anatomy and Wenckebach's phenomenon, the educational content has been discerned, designed, and delivered by the educator for the learner. It has, however, the danger of viewing the recipients as passive consumers.¹²³

'Pull' methods of teaching Second Degree AV Block: the case study of "Diagnosis Wenckebach" (YouTube)

In contrast, 'pull' opportunities in educational contexts¹²⁴ do not view learners as passive. Rather, they are viewed as active participants in the co-construction of their learning, which in turn is of great benefit to the learning process.¹²⁵ Hagel and Seely Brown write: "[p]ull models are ultimately designed to accelerate capability building by participants, helping them to learn as well as innovate, by pursuing trajectories of learning that are tailored to their specific needs."¹²⁶ One such example of 'pull' education is the *YouTube* video, "Diagnosis Wenckebach".¹²⁷

"Diagnosis Wenckebach" (Figure 3) was created by students enrolled in the Medical class of 2010 at the University of Alberta, Canada,¹²⁸ as a peer learning and teaching tool for studying second degree AV Type 1 Mobitz (Wenckebach's phenomenon). At the time of writing, this clip has been viewed over 818,878 times since it was first uploaded onto *YouTube* on 20 March 2007, prompting Mangan to refer to it as a "*YouTube* sensation."¹²⁹ The number of viewings escalates daily giving testimony to its popularity. Since the time of its uploading, the video has also been rated at the full 5 stars (out of a possible 5 stars) by those who have viewed it, although such ratings may relate to the entertainment value rather than its educational content. The clip runs for 3.33 minutes and can be located at the URL <<http://www.youtube.com/watch?v=GVxJJ2DBPiQ>>.



Figure 3: "Diagnosis Wenckebach", YouTube¹³⁰

“Diagnosis Wenckebach” is melodically and lyrically based on Justin Timberlake’s hit song, “SexyBack”.¹³¹ Mangan, writing in *The Chronicle of Higher Education*, argues that the medical students of the University of Alberta, Canada (Class of 2010) have “ditched their books and transformed their class notes into a pulsating, hip-hop music video.”¹³²

The material is simultaneously presented in the familiar format of vid-eoclips created to promote modern popular music, and at the same time echoes the century-old tradition of the end-of-year medical shows which involve spoofs and skits designed and produced by students and faculty.¹³³ Farnan et al. suggest that while this tradition has boosted various aspects of medical training, such as team-working skills, the audience has been, up to this point in time, the medical community, and not the wider public.¹³⁴ However, with the advent of sharing such skits on the video-sharing sites of Web 2.0 such as *YouTube*, these authors note that “the digital age has brought these shows out of the lecture halls and onto the desktops of [individuals] worldwide” which may or may not fully understand the content.¹³⁵

A comment posted on the *Marketing Insight for Higher Education* describes *Homer*, the e-learning management system at the University of Alberta, which is behind the clip.¹³⁶ *Homer*, the commenter argues, allows for more student-submitted and peer-policed content than Blackboard. Mangan, quoting a spokesperson from the University of Alberta medical school, writes that *Homer* provides students the opportunity to contribute to their own learning and the learning of their peers through their contributions, and that the system is “largely self-policed”.¹³⁷ That is, it is a self-directed peer-teaching and learning resource, and an example of the creation and co-creation of learning material. As such it is more aligned with the student-centric espoused theories of e-learning systems.

Effectiveness of “Diagnosis Wenckebach” as a Mnemonic

A mnemonic can be defined as an aid to triggering the recall of information. Congos argues that there are nine different types of mnemonics: musical (setting important information to music), proper names (a person’s name becomes an acronym for a list of items), expressions and words (a phrase to represent the first letter of the list to be remembered), models (items to be remembered are superimposed onto a visual model), rhymes (metred verse), organisation (separate main item from its constituent details or locate an item in its original layout), images (associations for the items to be recalled), connections (linking the item to be recalled with other individuating factors), and using the spelling of the word to aid memory.¹³⁸

Specifically in relation to “Diagnosis Wenckebach”, the videoclip contains overlays of several mnemonic devices. These four devices are music, rhymes, images, and connections. “Diagnosis Wenckebach” also successfully employs another device not found in the literature on mnemonic devices. This is the addition of polyvocality, which will be explored as a fifth mnemonic device within the videoclip.

Setting to Popular Music

“Diagnosis Wenckebach” is a spoof in the tradition of medical satire but also incorporates popular music. It is set to the tune (and corrupts the lyrics) of the popular music hit, “Sexyback”, by Justin Timberlake. In relation to music as a mnemonic, Congos writes:

Music can be used to help students recall important details to main ideas and many learners have made songs out of information when a list of items must be learned. Advertising on radio and TV uses music to help potential customers remember their products when shopping. With sufficient repetition of commercials, advertisers have discovered that when shoppers see their product in the stores that often the shopper will start reciting a oft repeated phrases from the commercial or start singing the lyrics to the promotion melody. The result has been increased sales of the product.¹³⁹

The tune helps the recall of the information contained within the tune, whether that is the details of a consumer product, or as in this case, the details of a medical condition.

The Use of Rhythmic Metre

Rhythmic metre is used in the lyrics throughout the clip. Similar sounds to the end syllable of each of the verses aid the recall of information. For example, the final syllables for each of the first four lines of verse one are ‘(Wencke)bach’, ‘fact’, ‘that’ and ‘attack’. Reinforcing this is the rhythmic device of ostinato chanted throughout the Chorus: “AV type 1 Mobbitz”. Rawlins and Bahha define an ostinato as “any clearly defined melodic or rhythmic pattern that is repeated persistently”.¹⁴⁰ The “Diagnosis Wenckebach” video-clip combines cyclical melody, rhythm, and lyrics. The rhythm reinforces and accentuates the lyrics, reinforcing meaning. Further, the refrain “Get this node going” is repeated four times at the end of the Chorus. It is an urgent and imperative instruction, accompanied by a beating pointed finger.

Use of Multimedia and the Alignment of Verbal and Non-Verbal Communication

The videoclip utilises powerful visuals to layer information. The clip commences with an ECG tracing of AV Type 1 block (Figure 3), then leads into an emergency cubicle where a 'patient' with this condition is being examined by a group of medical professionals. One of the benefits of video, as previously noted, is its ability to capture motion. Throughout the clip the medical students align hand gestures and body movements with aspects of cardiac electrical impulses.

Connections

Connectivity is another powerful mnemonic and relates to the linking the item to be recalled with other individuating factors. In "Diagnosis Wenckebach", lyrics such as "My PR intervals, they elongate" (Figure 4), "the QRS gets missed, oh what a shame", "restore my rhythm to sinus", "I need some atropine", and "you say benign", and are key words to the symptoms, ECG signs, treatment and level of seriousness of this type of AV block.

There are a number of examples of connections within the videoclip. One is with the range of diagnosis options suitable for restoring cardiac sinus rhythm. Coupled with the contextualised location of the videoclip (a hospital treatment room), there are several comments in relation to the gathering of diagnostic data through the obtaining of an ECG tracing, and ensuring that the leads connecting the patient to the machine are correctly attached, thereby eliminating any extraneous variable in the resultant tracing. Another connection is the link with the mention of atropine within the videoclip. It sparks a relationship with pharmacological interventions appropriate in treating the condition. Connections can spark higher order thinking processes that are necessary for deep learning to occur.



Figure 4: “My PR intervals, they elongate...” (“Diagnosis Wenckebach”)

Polyvocality in mnemonics

Unlike many univocal (one narrative voice) lyrics of popular songs, the lyrics within the video clip of “Diagnosis Wenckebach” are polyvocal. There are a number of definitions of polyvocality, including one which suggests that polyvocality is the “multiple tellings and multiple readings of an event”.¹⁴¹ However in the context of “Diagnosis Wenckebach”, the most fitting definition of polyvocality is defined as “the use of multiple voices as a narrative mode within a text”.¹⁴²

Polyvocality, the use of multiple voices, allows for the telling of the situation from a variety of perspectives within a given situation, and in “Diagnosis Wenckebach” these voices are the patient, the clinical cardiologist, and the treating physician. The clinical cardiologist delivers all the specifics of the condition of AV Type 1 Mobitz, with lyrics such as “It’s AV nodal block and that’s a fact”. The voice of the treating physician contains directives: “Take some more [ECG] recordings”, “Check lead II”, and “Get this node going”.



Figure 4: Polyvocality: “AV type 1 Mobitz...”; “Get this node going...”

The lyrics also contain a reminder to consider the patient in the assessment and treatment. “What you gonna do?” is a reminder to keep patients informed, and the comment “Don’t hurt me please”, accompanied by the ‘patient’s’ hand waving hand in front of the camera lens, helps students to remember to allay patient’s fears in the treatment process.

Peer Quantitative and Qualitative Responses to “Diagnosis Wenckebach”

Both quantitative and qualitative data on the engagement of viewers with particular videoclips is possible in the context of *YouTube*. Quantitative data can be gathered, as already noted, by the number of times a video has been viewed, the number of starts it has been rated, and the number of comments it has received.

Qualitative responses are quite powerful barometers of the effectiveness of any given learning environment and give depth to the quantitative data. *YouTube* has several ways in which qualitative responses can be made, either through video responses to the original clip or through text comments. Currently there are 385 text comments on the “Diagnosis Wenckebach” link in response to the video. These responses are predominantly positive, and relate to the educational value and/or the entertainment value of the video. The following responses are a selection taken from the many on the *YouTube* video comments list for “Diagnosis Wenckebach”:

Too funny! I wish I would have had this video to show back when I

taught the rhythms section in ACLS...it could have dispelled any anxiety the students might have had. Very creative!¹⁴³

Awesome mnemonic and great job all round.¹⁴⁴

These meds students drive the lesson home in a most concise and hip way ;D Now if only teachers could take their cues from these guys, the lessons might not be so dry!!¹⁴⁵

This is brilliant. I started singing this during my paramedic final.¹⁴⁶

...good job guys...will help us in better recall.¹⁴⁷

so funny...a great way to study.¹⁴⁸

m a med student n i think dis is de best way to remember wencke-bach...awesome job guys.¹⁴⁹

I'm a Physician Assistant student and our EKG professor told us to watch this video...awesome job guys.¹⁵⁰

This is quite likely the only time that the *Chronicle of Higher Education* has ever linked to something cool. Great video guys.¹⁵¹

Great! Will consider for education of new nurses. Thanks.¹⁵²

This is better than trying to read it from a book.¹⁵³

Amazing. I'll never forget Wenckebach again. (Would you be willing to do a music video on the different types of pulmonary hypertension because I am always getting them confused).¹⁵⁴

However while most of these responses to the video are positive in terms of either their educational value and/or their entertainment value, there are a number of critical peer comments on the site. Of these critical comments, a number relate superficially to the entertainment value of the video offering, such as the comment: "Silly".¹⁵⁵ This comment received negative peer responses in return, as did other similar responses.

Finally, a few critiques touch on the informational accuracy within the videoclip:

Love the video....although its not too medically accurate.....LOL.... you don't do anything for Wenckebach. Hope you didn't fail your exam. Its a benign rhythm....just watch it. :)¹⁵⁶

This last comment is reflected in some of the critical literature on the use of such Web 2.0 technologies as *YouTube* in formal educational contexts, targeting accuracy of information. As a benign cardiac arrhythmia, the unnecessary cardiac massage on the Wenckebach 'patient' in the

opening scenes of the videoclip is a case in point. Perhaps a more appropriate action would have been for the medical students to connect ECG leads on the 'patient' at that point in the video.

In summary, "Diagnosis Wenckebach" receives, in general, very positive quantitative and qualitative feedback from students and professionals alike. Apart from some areas of 'literary license' in relation to informational accuracy, which are to be noted, the videoclip is commended for its peer-teaching of educational content to neomillennials in an engaging way via the popular social-sharing media of *YouTube*.

Conclusion

Dede has argued that learning for neomillennial students is being driven by a variety of desires including personalised learning opportunities and communal learning.¹⁵⁷ The social-sharing technologies of Web 2.0, such as the popular video-streaming site of *YouTube*, have become a conduit for such possibilities.

Against this backdrop, the traditional 'push' approaches to education, exemplified by behaviourist and cognitivist pedagogies, are being challenged by so-called 'pull' approaches, exemplified by constructivist and connectivist approaches, which are co-created by students as prosumers in virtual, socially-shared spaces. While educators need to consider the possibilities of these educational shifts for engaging and deep learning opportunities within the competitive global marketplace of formal e-learning, they also need to be aware of the pitfalls.

The case study of the popular video, "Diagnosis Wenckebach", on *YouTube*, is one example of an educational scenario that has been customised. It showcases the intersection of production and consumption of neomillennial learning within a social-sharing learning arena, combining the delivery of information ('push') in a student-centred activity ('pull'). It is an excellent example of the co-creation possibilities of neomillennial learning, and one from which we in academia can learn a great deal.

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Monash University

Julie.Willems@arts.monash.edu.au

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