

# Using Google Glass to enrich printed textbooks in a blended learning environment to meet digital natives' expectations.

Anne-Dominique Salamin  
e-learning Center HES-SO Cyberlearn  
University of Applied Sciences Western Switzerland  
Switzerland  
adominique.salamin@hes-so.ch

**Abstract:** A great number of professors create learning resources such as textbooks to teach their students. Today, these resources are mainly available in paper format or printed by students by accessing a distribution platform. Therefore these seem unsuited to “digital native” students, who represent a large group in universities. Such groups seek new insights to acquire knowledge, based on video, simulations, interaction with the covered topics.

The aim of this article is to present how “digital native” students can improve their learning capacities and strengthen their motivation for learning, by intertwining new technological tools such a Google Glass and traditional textbooks.

## Context

More than 19000 students enroll every year in the different curricula proposed by the University of Applied Sciences Western Switzerland (HES-SO). This university offers students strong links with the real professional environment, either via very concrete courses (laboratory work, experiments, etc.) or by helping with developing projects ordered by professionals in action.

Globally, courses are provided by lecturers in frontal learning situations, but this University enriches its pedagogical concept by including blended learning to the curriculum. Right now, more than 1300 courses are available on line, published through the Moodle platform (<http://cyberlearn.hes-so.ch>). Most courses use the LMS as a repository and deliver knowledge through various paper textbooks.

To sustain the expansion of e-learning at the HES-SO, the e-learning Centre Cyberlearn was created, in 2004. This Centre now offers various services, ranging from LMS Moodle administration to specific resource development or on line course certification.

Following this thread, turned towards « new tools for new students », the HES-SO e-learning centre Cyberlearn has been developing, over the last years, various tools aimed at improving the learning process of students enrolled in the six schools available at this university<sup>1</sup>. Henceforth, mobile applications, simulations, games, videos have been produced in close collaboration with the professors. However, until 2013, students' needs were defined from an intuitive approach, from impressions and field experience, without truly identifying the actual students' expectations, massively stemming from the Digital Natives generation.

In order to ensure that our orientation truly met students' expectations, we launched a vast survey in early May 2013, on Cyberlearn's homepage, during two weeks. The student population totals 19000. We calculated the representative sample as follows: P (percentage): 50%, M (population size on our LMS<sup>2</sup>): 17430, C (confidence level): 95%. E (error margin): 5%. Depending on the settings chosen, the size of the representative sample is of 376. 800 students answered the questionnaire.

---

<sup>1</sup> Design and Fine Arts, Business management and services, Music and performing arts, Engineering and architecture, Health and Social Work.

<sup>2</sup> LMS : Learning Management System : we use Moodle since 2004

Most students generally study at a bachelor level (89%), a lower percentage is enrolled in master studies (8%) (3%: else). They are mostly between 18-26 years old (81%) (26-35 years old: 16%, older: 3%). 55% of them are women, 45%, men. They study in different schools : 38% in Economics and services, 24% in Engineering and architecture, 21% in Health, 16% in Social work and 1% in Design and Visual Arts.

As students, 59 % like interacting with their colleagues, 38 % deeply get involved in class learning activities, 31% like their professor to organize learning activities.

Among the range of questions, students were asked about how they could learn better. 14% reckon they do better by looking at graphs, videos, pictures and visuals, 12% by taking notes, 11% by listening to the teacher, 10% by summarizing the readings set for courses, 9% by explaining to other students, 8% by re-reading their notes, working alone or managing data (roleplaying, simulations, lab experiments), 5% by having the topics explained by another student and 4% by working in a group. It can be noted that listening to the professor appears in third position, whereas group work is considered a less effective learning approach from the students' point of view.

Another question asked in this survey concerned more specifically the orientation of Cyberlearn's activities: « As digital natives, what would you like to be made available to help you learn better? ». Generally, students opted for the availability of technological resources : Globally :

- 55% wish to watch more videos
- 47% want quizzes,
- 46% would like simulations,
- 40% would like video-podcasts courses,
- 31% would like more mobile applications and 30% serious games,
- 21% would appreciate the availability of wikis,
- 20% would like audio-podcasts courses,
- 9% wish to use blogs.

It can be observed that the use of video is voted in twice, as global resources and as podcasted courses. A majority of the answers show two approaches on how the students would use a video:

- To better understand some abstract notions or to enhance them
- To better revise for a course before an exam

## **New types of learning resources ?**

The answers delivered by the students show a strong inclination for interactivity and multimedia in general (video, audio, simulations, quiz). The interest for using such devices at university level, appears to result from three evolutions in the habits of our civil society:

- *Daily consumption of non written resources*  
Globally, in 2013, 90% of the world-wide users watched video content on the Internet from a number of different screens. More than a milliard individual users access Youtube every month to watch more than six milliard hours of video, knowing that 100 hours of video are uploaded every minute on this very site [3]. Nine out of ten among the 18-to-29 watch online videos, and almost half, 48%, watch online news videos [4]. 1% among the 76% students from our survey watch Youtube during class hours.

In Switzerland, in 2010, 44% of the population, regardless of age, watched video clips on the Internet [2] whereas in France only the 13-24 age group representing a 34% did the same. The watched contents can be commercials, personal videos, fiction film trailers, television programs clips, on-line reporting (webdocs). 1% of the 76% among the students from our survey watch videos on Youtube during class.

- *Enhancing written resources via rich media*

On-line newspapers, available for free or against fees, social networks (Facebook, Twitter, etc.) embed videos or series of images, in order to enrich coverage. 61% of Europeans read the press on-line, and 63% of Americans watch news videos on-line. More than 13% of the students in our survey say they watch the news regularly on-line and 11% of the 76% using their smartphone during class, claim to read the news on-line.

One HES-SO student claims : « I enjoy courses with videos, it's easier to learn something ». Another one says : « I think that video and audio courses are really good when something was forgotten.” He adds : “But it will never replace a real course. To catch-up, it's a good method.”

This rise in video consumption can impact on how information is integrated and possibly also impact the learning process itself.

- *The position adopted by the « consumer-actor » in society*

With the appearance of social media, the consumer has placed his hands on a direct communication channel with the brands, as well as a powerful striking force when producing a page on Facebook, for instance, against a product, and inviting friends to post mails for highlighting an interesting product or encouraging a certain type of behaviour. This method of interacting by relying on groups of “friends” or “friends of friends” greatly alters the more traditionally passive consumer position. Students, present on the social networks, increasingly accustomed to react, “liker”, “retweeter”, import this kind of behaviour to school.

While 68% of the French sign up to on-line social networks, and in the USA, 5h13 per day is spent on the Internet, the penetration of the social networks in the population reaches 75%, of which 54% solely via mobile phones. [8]

57% of the HES-SO students have a Facebook profile, 16% a Twitter profile, 2% a Tumblr profile, 1% a Path profile and 15% an Instagram profile.

## **Pedagogical experts ?**

Thus, according to the customs prevailing on social networks, where users can act as “specialists” of products or events, students likewise wish to be involved in the elaboration of their training. They can very accurately tell what they demand, as genuine pedagogical experts. It is surprising to note the answers to the open question “According to you, what is the ideal course”, where more than 500 out of 800 participants have described very detailed and comprehensive devices. This tends to prove the emergence of a new actor in education, the “client” student who knows what is good for him and wants others to know.

Of course, students’ demands need not be followed closed-eyed. Nevertheless, nowadays, as is the case at the HES-SO, where students take part in the pedagogical evaluation and assess every course module by answering a series of questions such as “Pedagogical competence of the professor”, it becomes relevant to strive for an improvement in pedagogical material made available to those students. Thus, both collecting the students’ expectations and attempting to integrate their ideas, involve a society thrust, as shown above, and some questioning concerning the resources devised for an outdated world.

Moreover, students signed-up in the tertiary level have somehow become learning “professionals”. They know precisely what they want, which methods are most effective in their learning process, and above all, they are aware that in the university environment, they need to have the best resources available, organised in the most efficient way and accurately customised to their needs. Accustomed to configure their requirements for mobile applications or digital devices, they can increasingly become considered as mature users, expecting the service most adapted to their needs and expectations.

## **A new type of resources ?**

The characteristics of « digital native » students show a weak capacity for attention span (some students in our survey mention 7 minutes of full attention, while others believe in 12 minutes) and the need for varying activities. By crossing these components (weak attention capacity, need for changing activities, great expectations for multimedia and video production), accurate information is collected among university students on what type of information is requested concerning the learning task.

Concerning the behaviour of professors and the type of resources used, the students likewise have very clear-cut opinions. Some extracts of their recorded answers enlighten their stance.

*“The teacher shouldn't read his powerpoint. No long videos in class where everybody knows each other. A quicker pace in the course to force students to pay attention. Audio material (microphones) which work. Professors who can talk loud enough and who stand in front of the class »*

*« A course where the professor can catch the attention of the students without having to remind the students to turn off their computers. A course which is not a slide presentation, but which is real teaching. The use of slides had a perverse effect: the professor doesn't transmit the topic, he merely presents slides. In some cases, the presence of the professor is no longer required: it's enough to just read slides by yourself, because there is nothing new added by the professor. Such courses are so boring. It' a real challenge of our time »*

*« The teacher explains the courses with illustrations and videos to keep the students' attention. I think it's important to vary the pace, the course activities, that is, lectures followed by individual exercises, movies, group projects, more practical projects,.. to get better attention and concentration from the students, then to have a larger view of the topic and its links with the real world. »*

Mentioned in this survey are video illustrations, rapid activity changes and the recurring request for attractive and motivating, and above all not “boring” courses. Although the psychoanalyst Françoise Dolto stated in 1979 that “to be bored at school is a sign of intelligence” [11], university students in 2014 expect to attend courses which entertain, interest, and enthral them. They hope for scientific resources, carefully selected by their professors, but shorter and visually more attractive than in the past.

## **The truth about textbooks**

In 2008, the Swiss Federal Statistics Department conducted a survey in Switzerland on the reading rate of various media. In the age group 15-29 (which comprises digital natives), 26% read 1 to 3 books for their studies, 19% read 4 to 7 books, 10% 8 to 12 books and 11% read more than 13 publications. Moreover, a study conducted by the non-profit section of the Pearson Foundation showed that, while 55 percent of students still prefer printed over digital textbooks, among the 7 percent of students who own tablet devices such as iPads, 73 percent prefer digital textbooks. [9] However, e- textbooks made up only 2.8 percent of total U.S. textbook sales in 2010, according to the National Association of College Stores. The reason lies in the fact that until today, digital textbooks have been rather flat. No added value is provided when compared to a .pdf version of the printed material. Students are, therefore, not very keen on changing from paper to digital material without any notable improvement over the paper version.

The tendency to change .pdf type textbooks into textbooks enriched by multimedia input and the use of interactivity is on the move. However, it will take some years before the academic book industry delivers most of its production in this format.

In a university environment, the resources provided by the professors and used by the students mostly come in a written text format. Personal webpages, articles for reading, textbooks, PowerPoint documents mostly composed of hierarchical text blocks, organised via bullets and hyperlinks to websites, which are all used by a professor to assist his teaching, truly lack a dynamic approach for meeting the students' needs or requests, and do not contain any enriched non-written resources, other than images or graphs.

## **Type of potential learning resources**

When knowledge, which needs to be transmitted to learners, is processed into a learning format, various didactic components can be created. Here is a non-exhaustive list :

### ***Didactic components***

- *Theoretical explanation*
- *Instructions*
- *Experience* : Description, Laboratory, Example of real life, Professional practice, Testimony, Simulation
- *Illustration* : Image, Diagram, Graph, Table
- *Validation* : Quizzes
- *Social interactions* : Peers, professors

Some of these items are present in paper textbooks and others must or can be enhanced by multimedia in order to enrich paper versions.

### ***Didactic components potentially present in a Textbook***

- a) *Present in a written format*
  - Theoretical explanation
  - Summary
  - Instruction
  - Experience description
  - Testimony
  - Diagrams
  - Graphs
  - Tables
  - Quiz
- b) *Not present*
  - Laboratory experimenting
  - Examples of real life situation
  - Professional practice
  - Simulation
  - Interactions
    - social with peers, professor
    - pedagogic with knowledge
  - Interactive quizzes

So how can paper textbooks be enriched without altering them, while at the same time making them dynamic and attractive?

By intertwining a mobile interface with the paper textbook.

## **New technology tools**

The mobile world offers a variety of objects for a flowing access to the Internet, some of which have become essential (smartphone), while others are becoming increasingly widespread (digital tablet). Some months ago, Google has provided the “Google explorers” with a new screen: The Google Glass. These smart glasses, which are expected on the market for sale by the end of 2014, beginning 2015, interact with the environment via a mini-screen, which delivers information in double exposure from what the user is observing. These glasses are monitored via a vocal command, the main advantage being that the user keeps his hands free. The Cyberlearn e-learning Centre managed to obtain a pair of Google Glass, in order to test how this new material could improve teaching and learning at university.

With this screen, the real world is enriched by various objects (video, sounds, images, data with figures), provided in real time. The Google Glass can, for instance, translate on the fly, display information on current weather, access a patient's file and retrieve relevant data when needed, without changing the on-going activity. It can also produce real-time videos and share them.

Henceforth, it was decided to develop an application which could enrich and adapt standard textbooks, in accordance with students' expectations.

By no means is it suggested that the Google Glass will replace course resources or the professor, overtime. Simply, we aim at enriching the experience for students using textbooks by providing a device which may become natural in the near future, just as the smart mobile phones have after some 10 years of use.

### **Description of the experiment**

As a start, we aimed at enriching a textbook, typically lacking this type of material. Therefore, we selected a relevant section of a textbook dedicated to enterprise communication, presenting written information concerning the production of a commercial about a product or a service provided by a firm.

Then, a variety of multimedia resources were developed:

- The production of a video using the Google glass, where the professor draws a classic communication diagram on the whiteboard, while commenting it and which is given the status ILLUSTRATION,
- A video where the professor presents a summary of the provided written information, which is given the status SUMMARY,
- An audio where a professor gives evidence of his professional practice, in direct connection with the explanatory text, and which is given the status TESTIMONY,
- A cost calculation simulation of a TV commercial, given the status SIMULATION,
- An interactive quiz with feedback with the status QUIZ,
- Advice provided when using a SWOT type simulation, targeted at analysing the commercial, which takes the status ADVICE.

Next, we created a short questionnaire for students to define their « preferred personal applicant profile” (PPAP), where the *applicant* is the student/user. This questionnaire is proposed before the students actually start reading the material. This questionnaire offers the student a variety of didactic components (video summaries, video experience, video testimony, quiz, etc.), he can choose from, and so create a profile with his didactic preferences. This profile is independent from the textbook content. It is required to determine what type of multimedia objects will automatically be proposed.

Once the questionnaire is filled in, the student's preferences are stored in a database. Then the application generates a QRcode, needed by Google Glass to recognise the student/user and the associated PPAP. The QRcode is read only once, and remains stored as such in the glass memory as long as the user brings no change to his PPAP.

The PPAP application then enables :

- To know the student's PPAP,
- To access multimedia resources and deliver them to the student at the relevant time, at the appropriate place during the reading of the material.

The following diagram shows how the PPAP functions.

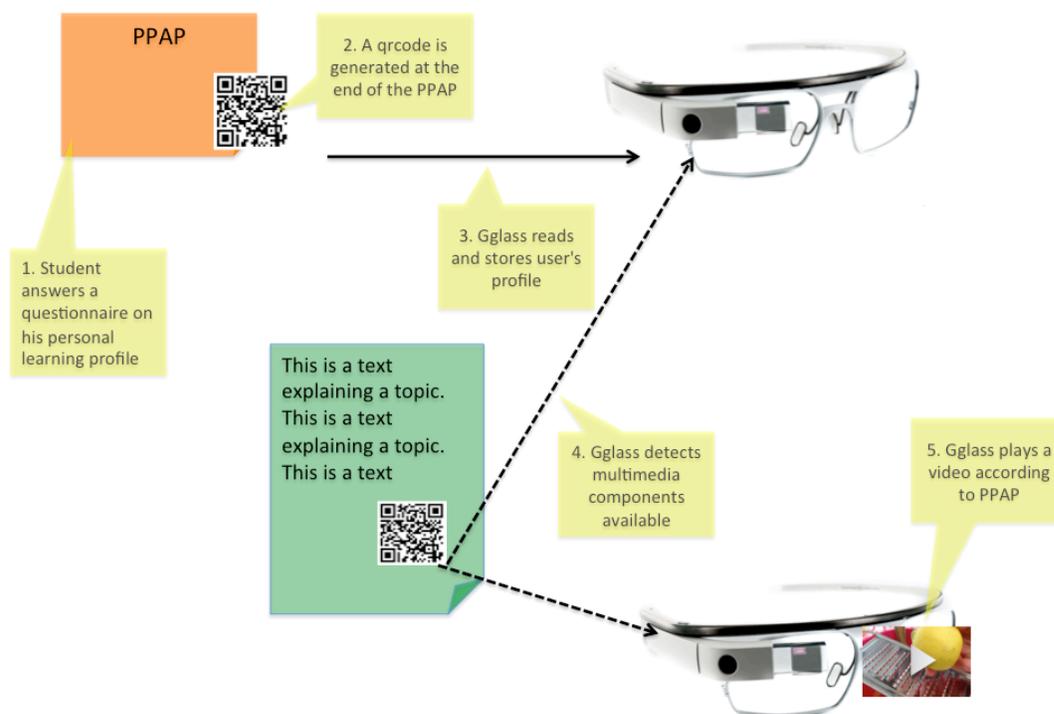


Figure 1 : the PPAP application

When the student opens the book for the first time, he puts on his Google Glass, turns it on and scans the QRcode previously generated with the questionnaire application. His profile is then recognised by the Google Glass until it is erased (for example if the glasses are borrowed by another user). Gradually during the reading, the Google glass detects other Qrcodes which send appropriate information corresponding to the profile. For instance, the Google glass is informed by a QRcode that a video testimony is now available at this point of the reading. Yet, the PPAP indicates that the glass user does not want to make use of this feature. So, Google Glass does not display the video, where a professor is commenting on a diagram. However, when the PPAP indicates that the student wishes to use this resource, it will be displayed on the screen to enhance the flat text.

We venture that a **paper** textbook **enriched** with resources, **whose didactic form was previously selected by the student**, contributes to improve the learning process and motivates the student.

So far, the application functions, the resources are available. We tested the different elements in our laboratory. We will engage in a second stage, consisting in testing our application with a sample of students, in order to measure :

- If the students appreciate to receive multimedia data dynamically while reading their textbooks,
- If the students feel more motivated in their learning with this type of application,
- If the students pay more attention during the reading,
- If the students have memorised the text information differently from a group without access to this add-on provided by the Google Glass.

The results for this test will be presented during the conference in October 2014.

## Conclusion

According to Prenzky [12], by comparing the digital natives' habits with those of the digital immigrants, of

which professors teaching at university level massively stem, we can observe three main differences. Digital natives long for interactivity and personal feedback, whereas the immigrants prefer collective management. Digital natives favour image, processed before text, whereas immigrants propose tasks favouring the text. Finally, the professor relies on a linear procedure for delivering his teaching, providing one item after another, whereas the student prefers processing several items simultaneously (multitasking). [6] Our approach aims at reducing the gap between the old and the new world, by providing the learners with image-type resources, more suited to the needs and expectations as defined by the student himself, and by concurrently embedding into the Google glass what the eyes meet when reading the paper format.

We shall conclude with the pedagogue Jean Piaget's questioning : "What is the aim of the school? Is it to format minds to what we know, and have known so far, and stay limited to reproducing and repeating what previous generations have done, or do we want to shape pioneer minds capable of new constructions in a variety of domains?" [5].

Modestly, the PPAP project is a move forwards in this direction.

## References

### • Websites

[1] <http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-video-Over-Internet-Consumer-Survey-2013.pdf>

[2] <http://www.bfs.admin.ch/bfs/portal/fr/index/themen/16/03/key/ind16.indicator.30106.160204.html>

[3] <http://www.youtube.com/yt/press/fr/statistics.html>

[4] <http://www.journalism.org/2014/03/26/news-video-on-the-web/>

[5] <http://www.fondationjeanpiaget.ch/>

Program « En question : Jean Piaget » Interview 14 November 1973

[6] [http://edutechwiki.unige.ch/fr/Natifs\\_num%C3%A9riques#Enjeux\\_p.C3.A9dagogiques](http://edutechwiki.unige.ch/fr/Natifs_num%C3%A9riques#Enjeux_p.C3.A9dagogiques)

[7] <http://www.blogdumoderateur.com/chiffres-2014-mobile-internet-medias-sociaux/>

[8] <http://www.wearesocial.sg>

[9] [http://www.nytimes.com/2011/06/06/business/media/06iht-EDUCSIDE06.html?\\_r=0](http://www.nytimes.com/2011/06/06/business/media/06iht-EDUCSIDE06.html?_r=0)

### • Readings

[10] Baier, K., Hendricks, C., Warren Gorden, K., Hendricks, J.E., & Cochran, L. (2011). College students' textbook reading, or not! American Reading Forum Annual. Yearbook [Online], Vol. 31.

[11] Dolto, F. (1979). « S'ennuyer à l'école est un signe d'intelligence », Le Monde de l'éducation, n° 49, avril.

[12] Prensky, M. (2001). From Digital Game-Based Learning. McGraw-Hill.

[13] Silver, Lawrence S., Robert E. Stevens, and Kenneth E. Clow (2012). "Marketing professors' perspectives on the cost of college textbooks: a pilot study." Journal of Education for Business. 87#1 pp: 1-6.

[14] Stone, Robert W., and Lori J. Baker-Eveleth (2013). "Students' intentions to purchase electronic textbooks." Journal of Computing in Higher Education 25#1 pp: 27-47.

[15] Wertsch, J. (1990). The voice of rationality in a sociocultural approach to mind. In L.C. Moll (Ed.), Vygotsky and education: Instructional implications and applications of sociohistorical psychology (pp.111-126). Cambridge, MA: Cambridge University.

[16] Yonker, E. & Cummins-Sebree, S. (2009). To read or not to read: How student characteristics relate to textbook reading. AURCO Journal, 15, 163-172.