

Is Wikipedia a relevant model for e-learning?

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NB : This is a shorter preprint version conceived prior the peer-review evaluation process.

ABSTRACT

This chapter gives a global appraisal of wiki-based pedagogic projects. The growing influence of Wikipedia on students' research practices have actually made these a promising area of educational research. A broad compilation of data published by 30 previous academic case studies was used. It reveals several recurrent features. Wikis are not so easily adopted: most wiki learning programs begin by a slow initial phase, marked by a general unwillingness to adapt to an unusual environment. Some sociological factors, like age and, less clearly, gender may contribute to increase this initial reluctance. In spite of their uneasiness, wikis proved precious tools on one major aspect: they give a vivid representation of scientific communities. Students get acquainted with some valuable epistemic practices and norms, such as collaborative work and critical thought. While not improving significantly the memorization of information, wikis clearly enhance research abilities. This key finding can assist teachers in determining whether the use of wiki really fits their pedagogic aims.

INTRODUCTION

In March and April 2012, the Pew research center led an extensive study on American teenagers' research habits. One of its main features implies a wide online survey of 2,462 middle and high school teachers. This indirect measurement underscores the radical evolution of school practices by the past decade. 94% of the teachers hold the use of Google and other search engines by their students as "very likely". Wikipedia comes as a rather close second, with 75% of likeliness. The traditional means of research stand far away: assistance by fellow-students (42%), study guides (41%), print books (12%) etc.

In the general recomposition of learning framework, Wikipedia seems to play a structuring part. It is the daily companion of millions, from undergraduates to academics, from amateurs to experts. This constant frequentation is not inconsequential. As every medium of knowledge, the online encyclopedia shapes the mind of its reader. Specific technical features and social processes condition a new kind of epistemology as well as a new way of apprehending scientific content (Rosenzweig, 2005; Cardon & Levrel, 2009; Weaver, 2010).

So far, Wikipedia has proven a valid experiment. As every experiment it should be reproducible or, even, generalizable. The flexibility of the wiki system makes it apparently an ideal model for innovative and yet practical way of learning: unrestrained collaboration has been constantly leading to the fittest system. Such an open structure seems to reproduce adequately the fundamental devices of the human mind.

Verifying such an hypothesis is not an easy task. During the past decade, about 50 academic studies have already been led on wikis and wikipedia as tools for e-learning. 30 studies required to a wide range of surveys and pedagogical experiences (from small 6-students groups to college-wide samples).

No global appraisal of this insightful literature have been made since Parker and Chao (2007), and, because of the rapid evolution of this recent research field, their comprehensive synthesis became briefly out-of-date. The seminal book on wiki writing edited by Cummings (2009) focused on original researches, without proposing any retrospective outlook. Several articles also attempted to recall the preceding developments of

fellow researchers; the extent of these “background” presentations remained nevertheless insufficient to give the overall picture.

This present work aims to present some kind of enhanced state of the art. It would not only include a comprehensive description of current researches but also articulate new and broader deductions. Wiki learning studies have actually produced lots of unexploited data. A general compilation of these isolated facts and figures might allow a better and more diverse understanding of the teaching effects and results of Wikipedia-like devices.

Methodology

The main objective is to give more definite answers on a recurrent issue: do Wikipedia-like pedagogical projects work? to what extent can they define an alternative model of learning?

Using previous case studies as our main research material entails several methodological choices:

(1) The sample studied is twofold: the academic studies as such and their corresponding metadata (date, names and so forth); the data published and introduced within these academic studies. As measurement procedures vary from one study to another, the compilation of the latter was limited to the less ambiguous items (number and age of the students, duration of the project...).

(2) The sample is narrowed to academic publications. The data they present are both more comprehensive and more trustful.

(3) The case studies all implied the use of a wiki system (sometimes of Wikipedia itself). It may well be that other platforms have a wikipedia-like status. However, their identification and comparison would have raised many preliminary concerns and made this general synthesis far more complex.

(4) Only issues developed at length in the wiki learning literature or easily deduced from the data set will be taken into consideration. Some promising areas of research are, therefore, deliberately overlooked. For instance, to this date, no extensive work was apparently dedicated to the reader’s learning experience. Lim (2009) and Lim and Simon (2010) presented several surveys of students’ apprehension of Wikipedia content. Nevertheless, their focus was limited to epistemic matters such as the credibility of the encyclopaedia.

All in all, the study will follow a most classic path. A general presentation of the research background will allow a better delimitation of the Wiki learning model. Thanks to this prior theoretical exploration, a core question will be addressed: what makes the wiki worthwhile? in which way can this device be useful to students? The presentation of the data compilation and of the advantages and setbacks recorded in the 30 case studies will frame effectively this *worthiness*. While difficult, setting up a wiki seems definitely rewarding when it comes to encourage critical thinking and scientific approaches.

BACKGROUND

Defining the Wiki learning model

The wiki was initially a conceptual invention. As early as 1990, Christine M. Neuwirth et al. proposed an anticipated description: they planned a co-authoring system in which each author would add his/her own contribution to a given text. Five years later, the WikiWikiWeb of Ward Cunningham gave a concrete form to this intellectual speculation (Ortega, 2011, p. 23).

The wiki was introduced in the academic literature in april 2001. Ward Cunningham published with Bo Leuf a well-read presentation of this new technology, “The Wiki Way”. Since then, wiki studies have flourished: Nicolas Jullien (2012, p. 3) counts as much as 8000 works of every kind (articles, conferences, chapter, books...) and of many disciplines (sociology, information science, history, statistics, political science...). In ten years, this wide research field has produced many insights on wiki affordances and abilities.

The clearest distinction between Wiki systems and usual means of knowledge is temporal. A traditional encyclopedia or guidebook proposes a state of the art. Yet, this state is not given; it is reconstructed in retrospect. Every ten years, the Britannica would ask an expert to rewrite or update an entry. The product of this readjustment is closed. It embodies a definite summary of the wider trends of knowledge on an object or within a field. All the to-and-fro of daily scientific research are erased. By contrast, a wiki can be written in real time (or, rather, in human time). The freshest findings, the latest inquiries and the newest models may all

be reported without waiting a year-by-year update. This fluid process unveils the ongoing dynamics of scientific activity (Weaver 2010).

This original relationship to research activities is reinforced by specific narrative practices. On a wiki authors are often unknown. In fact, every readers are also would-be authors. The accuracy of an article cannot be established through academic reputation and peers' recognition. The reassuring unity of signature(s) is replaced by the destabilizing succession of versions, revisions and diffs (Fallis, 2008, p. 24). This archeological way of scribing favors alternative means of validation. References and footnotes do not only enhance accessibility of knowledge: they define knowledge as such (Rosenzweig, 2005, p. 141). Wikipedia rules refers constantly to a constructivist view of science. Truth is a relative virtue, that mostly depends on the effectivity of social procedures and norms. Peer-reviewed articles are truer than journalistic articles, which are themselves truer than personal unrecognized speculation (Cardon & Levrel, 2009, p. 87).

These affordances tend to define an "architecture of participation" (O'Reilly, 2004). On a wiki, knowledge is not a one-directed nor a fixed production. Within a Wikipedia-like and/or a wiki-based model, learning is likely to depend on dynamics rather than predefined procedural stages. Content can be altered at any time by anyone. Consequently, the scientific quality of a given text may only be established through intersubjective judgement, rather than through the prescriptive force of social status.

Wikis in e-learning researches

Since 2001, at least 50 studies have been dedicated to the use of Wikis and Wikipedia for education purposes. This selection only takes into account noticeable works, that have been subsequently quoted and have played some part in the ongoing constitution of the research field. Within Jullien's more generous recension of 8000 wiki studies, education studies may go as high as 80-100. It is certainly remote from the dominant sociological and information science approaches, but not negligible.

The first items on our list are, logically enough, reports and presentations. Until 2005, the wiki remained a little-known technology, whose popularity extended scarcely computer science circles. The seminal work of Leuf and Cunningham (2001) presented the CoWeb project of Georgia Tech as a possible application of the wiki to education purposes. Augar et al. (2004) stressed that "this paper introduced wikis and explained how they work". Schwartz et al. (2004) proposed a mostly practical evaluation of educational wikis. Contrary to Konieczny's assumptions (2012), these early publications did not hold a negative view on Wikis and Wikipedia. The latter were not strangers nor enemies, they were one pioneering devices among many others (blogs, forums and the like...). Consequently, they have to be tested and verified.

As a matter of fact, in all the 50 studies, wikis never come to inspire fundamental rejection. Authors are most of the time positive, sometimes even when the experiment turned out not too well (for instance, Wheeler & al. (2008)). Educational wikis came out in a rather welcoming environment. Albeit regularly criticized, the constructivist paradigm has been recently reinforced with the advent of social networks. This paradigm is largely compliant with the wikis epistemic practices: meaning is not the product of a one-sided teaching, but of a dialogical exchange between two seemingly equal human consciousness.

Ten studies (that is, 25% of the selection) draw clear theoretical links with social constructivist pedagogy. Bruns et al. introduce this conceptual reference during the 2005 International Wiki Symposium (also known as Wikisym):

Wikis present themselves as an interesting tool for enhancing social constructivist learning environments. As non-linear, evolving, complex and networked texts with multiple authors, they can provide a great opportunity for student collaboration, coproduction of texts, argument, and interaction (p. 3).

This introduction may have lasting effects. The 2005 Wikisym was a significant event in the still short history of Wiki Studies: for the first time, people from all kind of disciplines exchanged their diverging interpretations on wikis. Bruns et al. were among the only one to talk from an education science perspective. Their constructivist views definitely partook the arising frame of research. During the four following years, at least two studies per year claimed this intellectual affiliation: Grant (2006), Robinson (2006), Parker & Chao (2007) Jones (2007), Wheeler & al. (2008), Elgort & al. (2008), Matthew & al. (2009), Cole (2009), Larusson & Alterman (2009).

Since 2009, a new theoretical shift has seemed to occur. The constructivist paradigm has apparently become less popular. Hughes (2011) greeted it only a slight reference. This might be the sign of a growing maturity and insurance within the research field. The constant expansion of bibliographies reveals some kind of

quantum leap: academics have enough tools and facts to analyze wikis as such, without having to rely to external wider theories.

WHAT MAKES THE “WIKI WAY” WORTHWHILE?

Testing the wiki

Most of the selected studies include case studies (approximately 75%). The radical novelty of wikis entails a large demand for tests and experimentations. Augar & al. (2004) gives a detailed account of one of the first use of wikis for learning purpose. By the late nineties, the Deakin University, Australia, created an e-learning program, the DSO (Deakin Studies Online), in order to ease the collaboration between several campuses. This program was not so satisfactory as half of the students expressed their discontent. The wiki was therefore contemplated as a way of breaking the ice and to “remedy the lack of interaction”. Its function was not educational but social: to enhance horizontal collaboration and acquaintances between students without any teaching frame. The initiative proved successful: the participation went from 300 edits to 4000 edits per month by the end of the semester.

This early experimentation is rather typical of almost every case studies. Learning institutions come to adopt wikis not on account of technophilia but as a possible remedy to preexistent difficulties. Therefore, the success or failure of the experimentation depends to a large extent of the nature of the initial expectations.

To this point, setbacks might be of more interest than achievements. Negative results generally depend on a few disruptive factors, that can easily be circumscribed. Five case studies have overly failed (Wang et al. (2005), Ebner et al. (2006), Cole (2010) and Judd et al. (2010)). Several others have come short of their initial expectations.

Judd et al. (2010) presented perhaps the most emblematic failure. They described a one-year learning activity requiring the use of a wiki in an Australian University. The population studied was unusually large and representative: 772 undergraduates in psychology. The objectives were twofold: creating a database of psychological concepts and getting acquainted with the constraints of collaborative work. The database developed accordingly. Yet, a closer examination revealed that most students never go beyond complying with the formal writing task. No more than 10% really played the game: they actually produced half of the wiki content.

Several less significant pedagogical attempts raised the same concerns. Ebner et al. (2006) recorded the uneven destiny of a Wikipedia-like structure in a German University: “It was interesting to notice that Wikipedia’s ideas and principles did not work (...) Almost none of the students edited the articles during a period of three month.” Wang et al. (2005) noticed an inverse relation between participation and quality of the content: the more students contributed, the poorer the content was (p. 3). Cole (2010) stressed that no students posted on the Wiki during the 5-weeks experimentation; nevertheless, it was suggested that “the fault lay not with the technology but with an unattractive course design” (p. 19).

Overall, content quality seems hardly an issue. Except for Wang et al., most of the authors observed scarce to significative improvements of students’ usual production. The main problem stressed by failed studies is social rather than educational: what is the better way to generate global collaborative dynamics ? The extent of failure depends mostly on participation parameters: Cole (2010) accounts for a wholly negative experience while Judd et al. (2010) expressed rather mixed feelings.

Growing accustomed to wikis...

The name wiki came from the Hawaiian adjective Witi or Wiki meaning quick or fast. This etymology is not gratuitous: Wikis have been mostly conceived on quickness purposes. It is a simple enough system to set up (the very first wikis required no more than 20 lines of code). It includes a simplified version of HTML: on Wikipedia, italic and bold style are defined by a succession of apostrophes ; hyperlinks are triggered by square brackets and templates by curly brackets.

In spite of these ergonomic features, the Wiki environment seems to destabilize most students, even when they are used to more complex digital structures. Chen and Reber (2011) noticed that the wiki made students a ‘little scary’. Even though numerous case studies dedicated a 2-hours or a 3-hours lesson to introduce the device, it was not always enough. Hugues (2011) stressed the necessity of an ongoing evaluation:

Despite the time spent on training and familiarization, additional class time needed to be allocated to the wiki project. When little activity was detected in the first two weeks, class discussion uncovered a lack of clarity of expectations, and a lack of confidence with the activity.

Consequently, most Wiki learning projects experience a slow start: rather than posting, students are constantly cogitating on the good practices to follow. Wheeler et al. (2008) recalled frequent questions about the style of the page (essay or bullet points) and on the where and the when of their editing. Familiarity came once those initial worries were lifted. Nevertheless, not all students adopt the wiki way. According to Konieczny (2012), in almost every class, a small to significant minority remain reluctant to this alternative way of learning.

An insightful chapter of Whipple (2009) shades some light on these recurrent troubles. This is not a case study but rather some kind of personal testimony. Whipple described his gradual acceptance of Wiki, coming through the following stages: curiosity, trial, resistance and accommodation. The resistance stage did not occur on account of technical difficulties; the main impediment was social. Whipple emphasized a hard and continuing struggle “with the issue of collaboration” (p. 230). Traditional roles between teacher and students were not easy to get rid of: “I can’t stop thinking, as many of us doubtless do, that the student paper is the student’s paper”. The public nature of the wiki created a considerable social pressure: “If work is publicly available on the Web, what information may/must/ought to be concealed?”

Students frequently share Whipple’s feelings. The virtual presence of the general public encourages some regular uneasiness:

In the meantime it is “a little scary” because not only the lecturer and fellow students can read what they have written, but also the general public (Chen & Reber, 2011)

The demands of collaborative work also represent a major challenge. Some students avoid deliberately counteractions with fellow students, mainly because they are not able to overcome their lonely working habits (Elgort, Smith & Toland, 2008). Sheeby (2008) perceived a global lack of common feeling. The mere idea of a collective work is hard to conceive: it implies a considerable conceptual leap.

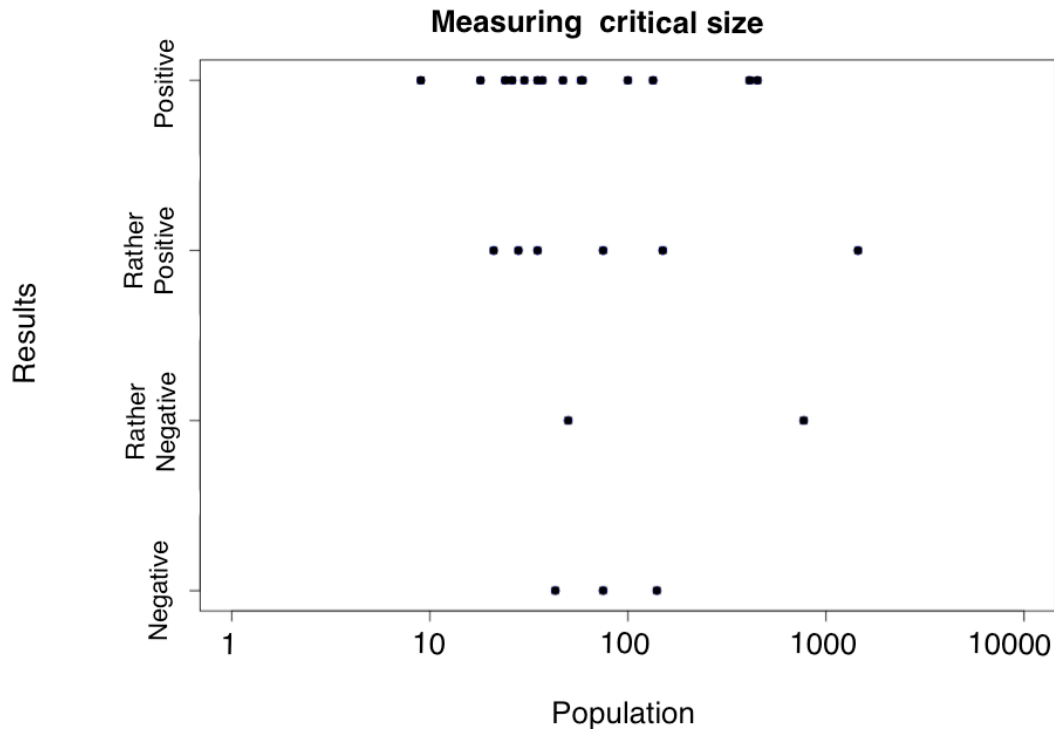
These conclusions are rather consistent with several sociological studies on the Wikipedian community. Relationships with fellow users never appear to be the prime motivation. In a survey led by Nov (2007) individual values clearly outdo social values: users are mostly driven by personal satisfaction (contributing is fun) and ideological agenda (wanting knowledge to be “free”). So far, working together is more a necessary constraint than an asset.

Critical size

The quantitative/qualitative virtuous relationship is a well-established topic within wiki studies. Cardon and Levrel (2009) described Wikipedia as an encyclopedia of ignorance: its quality is not guaranteed by individual knowledge but through collective vigilance. More users mean therefore more control and better appliances of encyclopedic rules.

Studies of wiki in Learning environment make no exception to this general rule. Chen (2008) recommended using “bigger sample size” (p. 71). Konieczny (2012) brought out the presence of a “global audience” and of a “larger community” as significant advantage in using Wikipedia instead of a specific wiki. Chen & Reber (2011) indicated similarly that the integration within a wider society of readers and authors is one of the most positive aspects of a Wikipedia course assignment.

In order to examine the validity of critical size argument, a compilation of preceding case studies have been attempted. Two sets of data seemed appropriate: the size of the ‘population’ surveyed and the global results of the experiment (from negative to positive). This compilation has clearly some limitations. The number of case studies (30) remains too low to draw definite conclusions. Besides, the measurement of the global results implies a qualitative notation. A scale of 1 to 4 have been retained, with the following specifications: negative, rather negative, rather positive, positive. While it is easy to determine whether a study has overly succeeded or failed, intermediary levels are more difficult to address. For instance, Wheeler et al. (2008) still hold very positive views on wikis, even though the experimentation did not go too well.



This plot points out a low correlation between results and population. General distribution in the (negative + rather negative) and (positive + rather positive) series is similar: the standard deviation of the former stands around 313 ; the standard deviation of the latter goes no higher than 327.

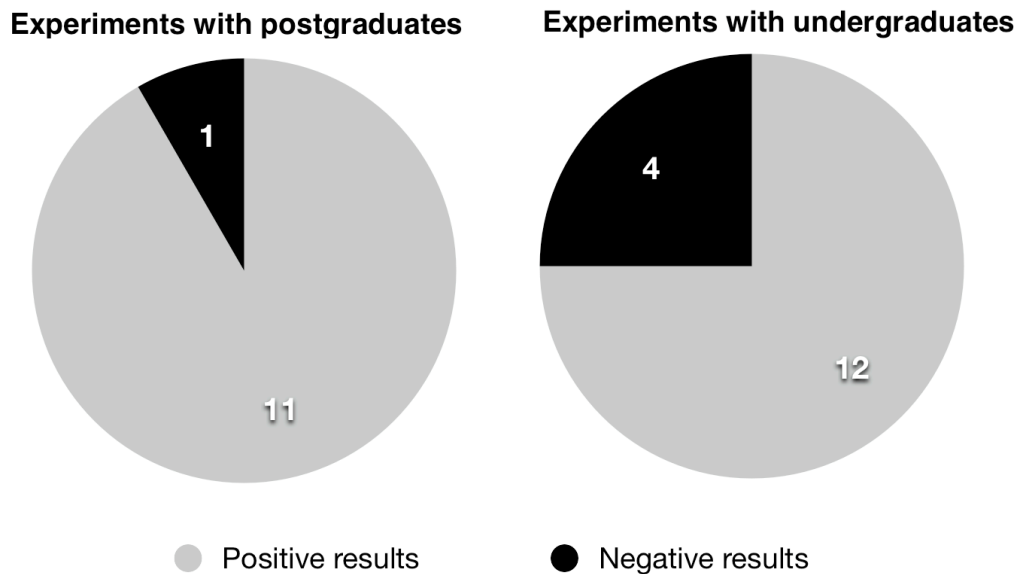
Contrary to an usual preconception, size does not seem to be a defining factor for learning wikis. Moreover, the smaller case studies (less than 50 students) have all been successful. Tiny communities may actually have their own virtues. Engstrom & Jewett (2005) noted that “teachers who arranged their students into small, cooperative groups of three to five students (...) expressed the most satisfaction with wiki”. Intersubjective rationality emerged more easily within those limited structures: students organized themselves through the spontaneous creation and assignation of specific roles such as “wiki recorder”, “research note-taker” or “discussion facilitator”. This observation mirrors Nemoto et al. (2011) evaluation of a “good team” on Wikipedia: the optimal collaboration network implies a high level of cohesion and centralization around several main contributors.

Sociological variations

If the critical size argument seems of little importance, social factors cannot be entirely dismissed. As a collaborative work, a wiki is bound to reflect the inherent tensions and symbolic relationships of human communities. Three main social dimensions seemed significant enough, the latter one being specific to learning institutions.

(1) *Age*: Several demographic researches show that Wikipedia is mostly written by adults in their twenties. A 2008 United Nation University survey by Glott et al. established the average age of 130,000 Wikipedia users around 26.8 years. The youngest respondents were no younger than 10.

Do these statistics reveal some kind of cognitive limitations ? Could most people not be able to write on wikis before having attained some degree of maturity ? A data compilation of the 30 case studies actually indicates a slight correlation between wiki learning success and the educational level of students. Out of 16 experiments with undergraduates, 4 failed, while out of 12 experiments with postgraduates, only 1 failed.



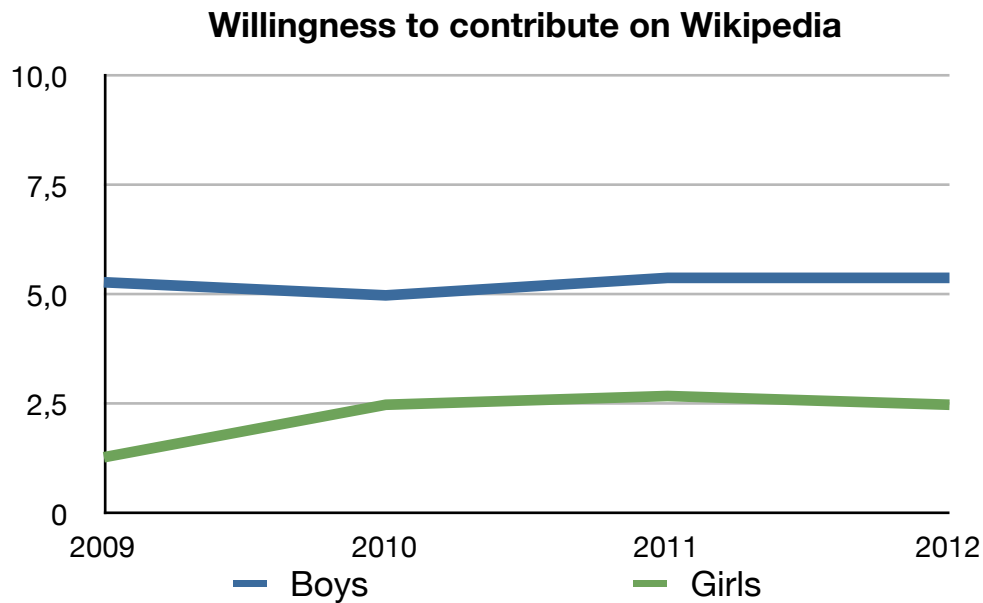
One possible hypothesis is that younger students are less at ease with innovative learning frames and prefer more reassuring, usual devices. Konieczny (2012) noticed that, whatever the class and its composition, only half of young students would « prefer a wiki assignment to a traditional one. »

(2) *Gender*: Wiki learning authors have seldom took gender variable into consideration. Wang et al. (2005) dismissed it as negligible:

Gender does not have a significant effect on exam scores. Also, there is no statistical interaction effect between editing usage and gender. Hence, it is uninfluential variable (p. 157).

Most case studies have not retained this major sociological dimension, generally on account of practical contingencies: “the researcher had no control over subjects’ gender” (Chen, 2008). Forte and Bruckman (2006) reported asking their students several demographic information, including gender; nevertheless these elements do not appear in the final results. The lack of data may well hide one of the major issues of wiki learning. During the past years, several works have extensively focused on the gender cap in Wikipedia communities. According to Glott et al. (2008), the average share of women is below 25% (p. 6). Antin’ et al. (2011) underlined similarly that most Wikipedia policies and rules are discussed and written by men contributors.

A Wikipedia course assignment led by canadian teacher and French wikipedia user Simon Villeneuve (2012) suggests that the wiki glass ceiling is still valid in educational environment. By the end of each year, he asked his students’ feelings regarding this pioneering pedagogical experiment. Girls’ general satisfaction was always twice lower than boys’:



Contrary to Villeneuve's apprehension, two case studies have done well with a mainly female population. Matthew, Felvegi and Callaway (2009) focused on 37 students in language arts, 34 being females; their conclusion was undoubtedly positive: it "resulted in a deeper learning of the course content and a rich understanding of the connections between their courses". Chen and Reber (2011) surveyed a German class in cognitive psychology including 10 females and 2 males: the feedbacks showed that they all were "highly motivated".

The gender issue remains somehow unresolved. The scattered and contradictory data from Wiki learning literature does not allow any extrapolation from the Wikipedia gender gap. Comprehensive studies on this subject would be clearly desirable.

(3) *Topics*: the 30 case studies sampling is too narrow to allow any calculable correlation between the results of the experiment and the educational topics. Nevertheless, one general remark can be asserted: studying information or computer science does not seem to be a major asset. While the Deakin University (Augar & al., 2004) and the Bergen (Chen & Reber, 2011) Wiki learning attempts were satisfactory, the Brunel University initiative (Cole, 2010) turned out disappointingly: after 5 weeks of observation, the wiki remained an empty space. Cole came to the logical conclusion that "even students taking a degree in Information Systems desired some guidance and tuition in using a Wiki" (p. 144). Conversely, courses which did not involve significant web literacy managed to fair results: Greek mythology (Honegger, 2005), logic (Byron, 2005), language arts (Matthew, Felvegi & Callaway, 2009)... To this point, age, gender and, most of all, the global efficiency and inherent setup of the pedagogic project seem more determining factors than preexistent computer formation.

The Wiki as *ars artium*

So far, setting up a wiki-based course is not an easy work. The teachers have to overcome numerous social resistances. This device actually breaks several well-anchored representations regarding the acquisition of knowledge, some demographic categories being especially sensible to these disruptions (to some extent, child and young teenagers). What could make all these investments worthwhile? The wiki has patently one major asset: its ability to reflect on a simpler basis the collaborative construction of knowledge within scientific circles.

Medieval and Renaissance schoolmen used to consider dialectic as *ars artium*, that is the art or science which aimed to describe and explain the inner structure of knowledge. Consequently, its main field of study is nothing but the art itself. Peter of Spain evoked 'the arts of arts and science of sciences giving access to the principles of all disciplines' (Jardine, 1974, p. 30)

Nowadays this function would be disseminated in a wide constellation of scientific communities: epistemology, cognitive science, science of education, information science, sociology of scientific knowledge etc. While reducing the frame-within-a-frame paradox, this dissemination makes it more difficult

to apprehend the fundamental rules and practices of research. Students are frequently unprepared to such formalized activities:

Undergraduates often experience a gulf between the identities they must adopt to participate in academic cultures and those of their home cultures. (Hyland, 2002, p. 1094)

Wheeler and Wheeler (2009) account for a recent realization of this great divide. Since the beginning of the nineties, numerous work have focused both on the experts' unsuspected cultural standard and of the ways of teaching academic writing. The former aim proved easier than the latter. Geisler (1994) brought out that most students never come to familiarize themselves with academic writing: they would rather develop alternative, often improvised tactics in order to apparently comply with scientific recommendations. To go beyond this stylistic-limited approach requires a good deal of efforts:

Radical transformations in teacher-student relationships will have to come about if schools really want to develop the fearlessness and independence that authorship in this culture apparently requires. The task is not easy and the potential for confusions and blunders is great. (Weese, Fox & Greene, 1999, p. 1094)

Wikis might well be precious tools to assist teachers in this difficult task. They effectively shake students' certainties concerning the production of knowledge. Bruns & Humphreys (2005) underlined the cumulative structure of a wiki page as a decisive incentive in favor of critical thinking: instead of exposing their own preconceptions as in a forum thread, wiki users are forced to rely on their own rationality in order to avoid critical evaluations from fellow users.

The social pressure previously highlighted have also some redeeming quality. As their work is not read once by one teacher but watched constantly for several weeks by a potentially wide public, students feel the need to enhance their usual quality standards. Grade is not the sole motive: self-esteemed and collective reputation became determining factors. Matthew, Felvegi and Callaway (2009) reported that academic-like methodologies emerged spontaneously:

Not only were students reading and rereading the wiki pages, they also reported careful reading of the course textbooks (...) As one student wrote, "I enjoyed this assignment because it forced me to jump into the textbook in a way that I would not have done on my own time." Another student reflected, "...I was forced to reread some information in the textbooks and really think about ways to elaborate on what was read." (p. 59)

In such a learning environment, students are not only writers: they also assume the roles of evaluators and, in a way, teachers. As an open network, wikis required some kind of minimal management. Wheeler and Wheeler (2009) pointed out an unexpected creative process of formal and informal rules. These constraints were so strongly admitted, that some students felt as if they have come to use an "unnatural" language.

In brief, Wiki communities share more than a similitude with scientific communities. The procedures of evaluation, the neutral rhetoric of wiki writing, the epistemological debates and conflicts, the relationships and the regulation of relationships between editors: all of these features are truly representative of science as usual. Being acquainted with them is essential to the formation of a free mind, able to develop a critical and rational approach toward scientific (and also pseudo-scientific) knowledge.

FUTURE RESEARCH DIRECTIONS

The Wiki learning research field remains recent and, to some point, loose. Consequently, it seems difficult to ascribe it some definite trends.

Future research directions are both a matter of description and prescription. Needs are high in the four following areas:

(1) Data measurements. The compilations introduced here only tackled a limited set of variables. Measurement actually varies from one case study from another, so that our compilation only comprises the broadest and most trivial elements: population, success or failure, topics and so on... A standardized comprehensive indicator would be certainly helpful. Balderas and al. (2012) have recently developed a promising application for learning Wikis: AssessMediaWiki. It allows to store easily the assessment of each student. Therefore, the assets and benefits of the pedagogical project may be determined in a much subtler way.

(2) Epistemic value. Encouraging scientific skills and methodologies appears as the main asset of the “wiki way”. Yet, the epistemic value of a specific device is uneasy to circumscribe. This study has not gone beyond a mere recollection of effects, that is the registered facts that students were crossing several sources and developing critical attitude toward published knowledge. Albeit limited to mathematics, the ongoing doctoral thesis of Joe Cornelli delivers some valuable insights on peer learning. Following the Wikipedia model, he defines this particular way of apprehending knowledge as *paragogy*, that is parallel (*para-*) leading (*-gogy*). Instead of receiving information from an unique teaching source, peer-learning students are going through an horizontal collaborative process. The lead does not come from a definite point, but from around. Peer-learning models reflects in a way the famous medieval formula: “center everywhere, circumference nowhere”.

(3) Long term effects. So far, with the exception of Villeneuve (2012), all the case studies lasted no longer than a year. Yet, the wiki positive effects may be more apparent on a long time basis. The assimilation of mature research habits have actually less immediate consequences than the assimilation of definite facts or models. A retrospective survey of several participants of previous case studies might proved insightful. For instance, the successful Deakin University program was set up almost ten years ago (Augar et al., 2004). Such a temporal distance would allow a deeper understanding of the wiki epistemic value.

(4) Gender. As previously pointed out, the existent data on the gender issue remain both scarce and contradictory. Comprehensive qualitative studies would clearly prove useful. It is not only a matter of defining the extension of a possible gender gap, but also of identifying the female students specific motives for rejecting wiki-based projects.

CONCLUSION

So, are Wikipedia-like pedagogic projects effective? To some extent, yes. Of the 30 case studies selected, 25 proved successful. The failed attempts resulted mostly from a lack of preparatory work and continuous monitoring.

Albeit good, wikis are also demanding tools. Teachers have to take into account a slow initial phase as the students do not adapt so easily to this unusual device. Even with a suitable framing, some factors still limit the benefits of the experience. Not all the student adopt the wiki way: some of them are persistently reluctant. Age is a possible factor of acceptation/rejection, as wiki projects with undergraduates failed in a larger proportion than those with postgraduates. Class size does not seem to matter: in the sample, tiniest learning communities get along even more easily.

Therefore, adopting a wiki is merely a matter of initial aims and purposes. The most quoted defaults of the device (social pressure, difficulty to conceive a collective work...) could have some redeeming qualities, according to the general direction of the pedagogic project.

As an initiation to academic writing and practices, Wikis are truly efficient. They embody a comprehensive representation of effective relationships within scientific communities. They consequently fulfill a long-expressed wish: familiarizing students with fundamental research.

The stakes here are much wider than merely assisting would-be academics. In a democratic society, the comprehension of scientific activity is essential. It gives one the ability to distinguish the inherent credibility of the circular discourses within the public sphere and to dismiss pseudo-scientific ravings.

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