

EASY, COLLABORATIVE AND ENGAGING - HOW GOOGLE APPS FOSTERS CONSTRUCTIVIST LEARNING IN A KNOWLEDGE MANAGEMENT CLASS

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-- Draft Version for OLKC 2011 Conference in Hull --

ABSTRACT

<..to be completed..>

KEYWORDS

KM course design, constructivist learning, self-learning competence, learning technologies

1. INTRODUCTION

This paper describes how teachers can use the Education Edition of Google Apps to foster constructivist learning and action competence of students in the classroom. It explores in a case study research in which way the constructivist learning method and the collaborative design of Google Apps support in their combination both the purpose and the learning contents of a final year knowledge management class in an international business school in France. The key question of this study is as follows: Do changes in learning design and the use of collaborative information technologies in the Google Apps environment create additional interaction and reflection in the classroom and lead to the intended acquisition of critical knowledge management competences of students?

To investigate the key research question, we present in the introduction of this paper a short overview of the relevant literature. We explain with reference to the knowledge-based view of the firm why business education needs to innovate and outline why the learning objectives of business courses need to move from knowledge acquisition to competence development. In the final part of the introduction we argue that higher education is stalled in traditional designs and dominant models for learning and that the emerging range of web 2.0 technologies have the potential to bring innovation into the pedagogical arena.

The main part of the paper presents the case study on the use of a constructivist learning method and the Google Apps environment in a final year knowledge management course. We outline the qualitative research design and illustrate the main sources of evidence to investigate the research question in the case study. We describe in detail the constructivist learning design of the course and analyse the evidence for indications that students' learning outcomes have reached beyond mere knowledge transfer and started to acquire specific competences that relate to knowledge management topics and concepts.

In the findings we compare to which degree the analysed evidence supports our initial assumption that a well-balanced combination of innovative learning activities and col-

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laborative information technologies can move the learning outcomes of a business course towards competence acquisition. We describe how the constructivist learning design has led to changes in teacher and students roles and how the collaborative and transparent nature of the Google Apps environment has impacted the traditional delivery of knowledge and the feedback in teacher assessments. Based on our observations of the pedagogical experiments in this knowledge management course, we explore underlying factors for a successful implementation of learning innovation.

In the conclusions we summarise our findings, and we address critical issues for learning innovation and the use of collaborative technologies in the classroom. We reflect to which degree the presented case can be seen as a new way to develop competences of students for a topic like knowledge management in business education. We present strengths and weaknesses and we discuss critical issues of the approach that we have taken. These issues include scalability of constructivist learning activities, path- and context-dependency of the learning design and to which degree learning contents influence the feasibility of pedagogical innovation.

Why business education needs to change: the transition to knowledge-based markets

We think that business education needs to change as it no longer fits the expectations and requirements of a fast changing business reality. New principles for business education and have to take changing views of firms and markets into account to break with long established rules of traditional teaching and learning processes in established course designs. We give below three perspectives that illustrate the changing context and the corporate need for different competence profiles of business graduates.

Chesbrough (2003) emphasises in his research on open innovation the role of technology as driving force for re-defining modern business; he writes that technological innovations create new organisational models as existing boundaries between firms and open markets are increasingly blurring and interwoven with each other. A considerable shift of corporate assets from the inside to the outside of company boundaries is taking place. This shift is closely connected to the role of knowledge in business processes. The transversal impact of information technologies in markets and the dynamic evolution of the web 2.0 phenomenon have initiated a rethinking of the origins for competitive capabilities of firms. Concepts like open innovation and enterprise 2.0 (McAfee, 2009) build on notions of democracy, transparency and lateral decision-making, as they represent this evolving view for understanding management success in the modern corporate world.

Hamel (2007) advocates in his latest book the 21st century management model. His model gives us a sound impression of the kind of managerial skills that are needed to fit the new rules of the game. Hamel rethinks in his work almost all aspects of corporate strategy, governance structures and decision-making rules. Key principles of the 21st century management approach are lateral corporate structures and decentralised decision making processes. The potential of lateral corporate structures is to allow employees to make their own decisions based on qualitative and contextual knowledge, recognition of patterns, and intuitive sense making in information-rich competitive environments. These principles offer a more feasible management than traditional hierarchies to fit the rules of the game in the knowledge economy, as firms have to be flexible and capable to operate in fast-moving and highly complex markets.

Finally, think about the main premises of the knowledge-based view of the firm. The term knowledge economy implies a pervasive, technology-driven change in markets and

firms, as it places knowledge and application of highly developed and often digitalised tools and crafts at the center of economic activities. When we synthesise the key points of prominent knowledge management authors like Alavi and Leidner (2001), Davenport and Prusak (1998), Drucker (1992 and 1995), Grant (1996), Kogut and Zander (1992), Malone (2004), Nonaka (1994) and Spender (1996) we can assert that (1) knowledge has become the most valuable means of production, that (2) knowledge workers own their means of production, and that (3) modern workforce loyalty comes not primarily through the monthly paycheck, but through input and yield from creativity and knowledge in peer groups.

It does not matter for our topic if you prefer to choose the open innovation view, the 21st century management model or the knowledge management view to make sense out of modern business. All three perspectives emphasise that markets, firms and workforces have undergone a transition towards creating ideas and sharing knowledge to add value for products and services in modern business contexts. This transition leads in consequence to changing competence needs of firms and changing demands for business education to offer adequately prepared graduates to the labour markets. The demand for educational innovation is very much an industry-driven process. Firms, which act in technology-rich and knowledge-intense business sectors, increasingly advertise job profiles for university graduates who are able to demonstrate a proficient level of job-related action competences.

By screening the industry demand for highly agile knowledge workers, it becomes clear that graduates need more than subject matter knowledge to cope with the fast changing and complex work contexts in modern business environments. Apart from specialised subject matter knowledge, modern knowledge workers need to bring along personal, activity-related and socio-communicative competences which form the basis for their proven abilities to face substantial managerial challenges (Lemieux, 2006; Goos & Manning, 2007; Katz & Kearney, 2006; Spitz-Oener, 2006).

From qualifications to competence-based learning in business education

We rely in this paper on the concept of action competence to understand how course designs have to change to better respond to the current industry needs. Action competence combines cognitive and motivational components into one holistic system of knowledge, skills and attitudes. It assumes a learning process at the core of competence development. This is an important aspect as it means that we can acquire action competence through learning. Finally, action competence obviously puts an emphasis on action or on performed behaviour. We can use the action competence concept to analyse tasks and challenges in modern work contexts. This analysis helps to identify critical managerial competence for modern business environments. The particular context of performance defines and specifies competences that are necessary to act adequately in a given situation (Weinert, 1999; Schneckenberg, 2008).

We can use the above outlined new industry realities to create an ideal profile of the modern knowledge worker. This profile would include the following generic competence traits: problem solving and critical thinking; communication and social skills and teamwork capability; digital literacy as mastery of web tools and capability to trace and use critical information in the internet; independent learning and self-learning competence; and creativity and risk-taking capability. This list of generic competences does certainly not mean that subject-matter knowledge has become irrelevant. To the contrary Bates (2010) specifies that subject matter expertise is overarching all other competences. This means that the mentioned competences are embedded into the subject

matter expertise. It serves as a kind of bracket that frame the listed key competence for the modern knowledge worker and give it a specific direction for action.

How can we take the changes in the industry landscape into account to think about developing competences of future managers in business education? While students in traditional course designs have been largely concerned with mastering the acquisition of subject matter knowledge, the challenge for constructivist approaches is to develop and encourage their reflection and competence development. The changing expectations of firms towards graduates create in turn the need for a competence oriented redesign of learning activities in business education programmes. The tentative competence profile for knowledge workers gives a clear direction for learning designs in business courses that respond to the industry needs and help developing graduates that better fit the complex and unstable realities of the knowledge economy.

We argue that a well-balanced combination of constructivist learning activities and collaborative technology environments like the cloud computing platform Google Apps can give business courses the potential to foster the competence development of students. While constructivist learning and knowledge sharing are long-standing and well-explored topics in educational research, emerging cloud computing environments like Google Apps offer new opportunities to support and enhance these pedagogical objectives.

The first step in the change process is to rethink the pedagogical principles that teachers use in their courses. The pedagogical design serves as the basis for constructivist learning. This design has to be defined in the right way even before the use of technological learning environments is considered. The change of technological possibilities is usually less important than its potential to help creating new educational approaches which result in a better fit of graduate profiles to market needs. Mandl & Krause (2001; see also Zawacki-Richter, 2004) state that situated learning and cognition supports the development of action competence. They propose the theory of constructivist learning as framework for the design of interactive learning environments. They perceive learning to be a self-organised process in which learners actively construct knowledge. Learning takes place in phases of cooperation between learning individuals. Associated attributes of the learning process are self-organisation, interaction, social exchange and cooperation. These attributes provide reference points for a learning design of business courses which actively encourage the development of action competence.

Learning environments like Google Apps integrate a variety of collaborative web 2.0 technologies which support individual reflection and social interaction. Authors like Chatti et al. (2007), Downes (2007), Happ (2008), Niemeier (2008), Sclater (2008) and Wilson et al. (2006) propose new pedagogical design perspectives that are closely coupled with the web 2.0 philosophy. These perspectives help to rethink the purpose of technology-enhanced learning environments in education, question the existing industry standards and open the way towards competence development of learners.

Technological platforms serve this way as an efficient vehicle for the reconfiguration of course designs which focus on learning outcomes rather than curricular inputs (Bates, 2010). This view is in line with the position of Stieler-Lorenz & Krause (2003), who perceive the competence orientation as a key driver to rethink learning designs in higher education. Garrison (2004) states in a similar way that the latest generation of learning technologies requires different notions of pedagogy. And Privateer (1999) writes that it is not feasible for universities to continue a tradition of teaching and learning, which is

significantly at odds with the set of web technologies that are currently altering the way humans learn and interact with each other in networks and communities.

While new technologies arrive at a fast pace, the current educational practices in universities are slow to respond. Nonetheless, the presented perspectives help to rethink the purpose of technology-enhanced learning environments in education and to move business education towards competence development of learners. We describe against this theoretical background how the above outlined concepts have been used in a final year knowledge management course to put constructivist learning and knowledge sharing into pedagogical practice. Before we discuss the pedagogical design of the course, we define knowledge management here as a strategic choice of organisations which combine the creativity of their workforce and the potential of information technologies to foster their competitiveness in dynamic markets (Alavi & Leidner, 2001; Gallupe, 2000; Malhotra, 2000).

2. THE CASE: CONSTRUCTIVIST LEARNING AND GOOGLE APPS IN A KNOWLEDGE MANAGEMENT COURSE

The course 'Knowledge Management for Competitive Advantage of the Firm' (30 hours, 5 ECTS) is offered to an international group of third-year (final study year) master students at the ESC Rennes School of Business. The course aims to equip students with an understanding of the linkage between corporate strategy, knowledge management activities and competitiveness of firms. A key learning objective for students is to explore models for creating knowledge sharing cultures in firms and to find out how information technology can enhance this organisational development. Students learn not only about the knowledge-based view of the firm and the human resources implications in which employees are perceived as knowledge workers who have both autonomy and responsibility to self-organise work tasks; by using collaborative software in the Google Apps platform, they apply these central knowledge management ideas in their learning processes during the course.

The pedagogical model of the knowledge management course has been decidedly constructivist to enable teaching innovation. Both the experiential learning model of Kolb (1984) and the spatial design concept of Vince (2009), which proposes a round table configuration as basis for constructivist learning, have been explained to students in the first session of the course. The group has then rearranged the seats and benches in the classroom as a round table. This first step to change the spatial design of the classroom has served as a group initiation into a constructivist peer environment, where the teacher acts as facilitator and students learn as peers.

The use of Google Apps as collaborative learning environment for the students is a key component in the pedagogical design of the knowledge management course. We have started to use the education edition of the Google Apps platform at ESC Rennes School of Business in the winter semester 2009/10. Google Apps is a web-based cloud computing platform which features a portfolio of software applications. It is build as a work environment on the principles of collaboration, communication, and ease of use. Google Apps includes customisable tools like Gmail, Google Groups, Google Calendar, Talk, Docs and Sites. Teachers can apply this portfolio of tools in the platform to shift the pedagogical model from teaching to learning and to emphasise student-centered learning activities and reflection on course contents. The empowerment of students and the process-ownership of learning tasks are in this context pedagogical design options

which relate almost naturally to the topic of knowledge sharing and managing knowledge workers in modern business (Drucker, 2005).

Google Apps has been used to both organise and facilitate access to learning contents of the knowledge management course and to enhance self-directed and constructivist learning of students. Examples for the use of Google Apps as course organisation platform are: The Google Sites structure to deliver the course description; Google Calendar to visualise the schedule; the announcements tool to keep students informed on course updates; the list function to create an overview of topics with readings which links directly to the electronic article database of the library, so that students can download the literature in a single click; a file cabinet site to share research articles and to upload student assignments; and Google Spreadsheets to publish continuous and final assessment grades of students.

The teacher has made no single lecture in the whole course. Learning activities had the pedagogical aim to let students continuously reflect on their key topics for the written literature assignment that they had to hand in at end of the course. The freedom of choice of students for their learning topics, as well as reflection and ownership of learning processes have served as guiding principles for the pedagogical course design. Each student has selected from the readings list one research topic for presentation in class and for in depth elaboration in a written literature review. By choosing a constructivist learning model and collaborative learning technologies, the teacher has introduced a range of learning tasks that place students in uncertain and open contexts and ask for creative processes to develop appropriate learning outcomes (Mandl & Krause, 2001, Schneckenberg et al, 2010).

3. RESEARCH DESIGN FOR THE DATA ANALYSIS

We have used a qualitative research design to collect and analyse the interaction patterns and learning results of students within the knowledge management course. The combination of constructivist learning activities and the collaborative nature of Google Apps encourages students to interact and to experiment in new ways. We assume that students apply within these technology-enhanced learning interactions the theoretical knowledge of the knowledge management course and put key principles for knowledge creation and sharing into practice. We rely on a systematic, practice-based analysis and interpretation of the learning activities and artifacts of students to validate this assumption. The following table summarises the sources of evidence that students have created during and after the knowledge management course.

Table: Sources of Evidence

Source of Evidence	Description of Source
Course Site	The course site presents essential information on the course syllabus and contents. It structures the learning activities that students have carried out, contains all learning artifacts and integrates a portfolio of collaborative tools that we have used during the course to support and enhance the constructivist learning design.
Literature Reviews	All students had to upload an individual written literature review for a specific knowledge management topic of their choice as final course assignment to the Google Apps environment. The quality of the reviews give an indication of the impact that the constructivist design has made on the commitment of students for the course and their understanding of key knowledge management principles.
Class Presentation	The continuous course assignment has been the class presentation of the topics

	that students have selected for their literature reviews. Students had to upload their files before the presentation has taken place and we have experimented with a number of collaborative tools in the Google Apps environment to actively involve the course group into synchronous peer feedback activities while their colleagues have presented.
Brainstorming Artifacts	The course design contains a number of individual and group brainstorming activities. We have used both traditional media and features in the Google Apps environment to produce and share learning artifacts during these brainstorming activities. All learning artifacts are documented and freely accessible to all students in the Google Apps course environment.
Student Feedback	Student feedback sheets as well as individual and group feedback to the teacher give further indications on students' acceptance of the constructivist learning design and the use of the Google Apps environment, and illustrates how they perceived the impact of this design on their learning outcomes.
Master Dissertations	A number of students have chosen to expand their literature reviews after the course finished and to write their master dissertations on a knowledge management topic.

The table shows that the project has generated multiple sources of evidence. This allows us to carry out a triangulation of data sources to find out in which way the course design and the use of Google Apps has shifted student learning from acquiring subject matter knowledge to developing action competence. Yin (2003) has characterised data triangulation as a corroboratory strategy to collect and analyse information from multiple sources in order to stronger support interpretations of a specific phenomenon. The analysis of multiple sources helps to create a convergence of evidence, to establish a common and more reliable ground for a concise understanding of the observed phenomenon.

We describe in the following how we have designed learner-activating assignments and how we have relied on information technology to enhance the learning activities of students in the course.

4. FINDINGS

Constructivist learning activities in the course have included individual and group reflection processes - like visual concepts, creative destruction jams, idea clustering, and brain storming sessions. All learning activities are documented in different formats in Google Apps. The Picasa image integration of Google Apps has for example been used to create a learning artifacts gallery that contains photographs of all brainstorming activities, which students have worked out on flip charts, Posts Its or the whiteboard. File cabinets and the comments function of Google Sites contain both formal course assignments as well as spontaneous reflections of students on presented course topics.

Students have used Google Apps in a variety of ways to integrate relevant learning contents like websites, articles, blog entries, videos and presentations for discussion into the course site and to reflect on knowledge management topics. They have for example used Google Sites and Google Docs for peer reviews of presentations. Each review has been written synchronously by two students, who have followed in real time the presentation of a peer class member. They have equally used Twitter and Yammer as microblogging tools for peer reviews. The Wiki function of Google Sites has served to carry out writing activities in class, where all students have created structures for their literature assignments that could be accessed and compared on the spot by the whole group in the writing process.

The teacher has created a specific site in the course environment to give students feedback on their formal continuous and final assignments. The site is called 'feedback to student work' and contains all evaluations for their paper presentations in class, as well as for their written literature reviews that they handed in at the end of the course. All evaluations on this site are freely accessible to all students of the course. This site has added a lot of value to the feedback process for students, as its transparency considerably increases the obligation for the teacher to assure an objective and fair feedback and grading in the course. Transparency and fair process are at the same time topics we find in the literature as key conditions for the creation of knowledge sharing cultures in firms (Kim & Mauborgne, 1999; Hausschild et al, 2001).

An interesting aspect for the practical implications is the learning outcome that the course has initiated a reflection of students to rely on the experiences, which they made with use of Google Apps, for positioning themselves more efficiently in future job markets. Students have started to create online profile and to set up accounts in social networking services. They have also started to perceive more consciously the importance of online reputation for their future job applications in industry. Students have gained this way in addition to subject-matter knowledge a better understanding of and confidence to use web 2.0 tools for their own professional career plans.

The course evaluation of students has been with an overall rating of 9.35 out of 10 possible maximum points very positive. Students have in particular liked the capability of Google Apps to support as collaborative technology platform self-responsible learning and to create fun in the classroom.

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5. CONCLUSIONS

The use of Google Apps as learning environment in the knowledge management course has created a number of interesting effects. It has created a substantial shift from teaching to learning. Students have developed a high level of engagement for their learning topics; this becomes evident through the overall excellent quality of student works in the class presentations as well as in the final literature reviews. In the end, the success of the course owes probably a lot to the creation of a more democratic and participative learning culture in the classroom. Explaining the hidden power relations in spatial designs and moving the desks to a circle have really served well as symbolic actions to step back as teacher and to empower students in the course. The combination of constructivist learning design and empowering collaborative software have this way created an interesting and dynamic environment which has helped the students to not only learn knowledge management theory, but to start putting some of its ideas into practice.

The tools in Google Apps have been useful to organise learning contents, to enhance the constructivist model, to set up and to engage students into collaborative learning sessions, and to create transparency and equality of peers in the classroom. The technologies have made teaching as well as learning performance more visible, as the roles of both teacher and students in the learning processes become easy to trace. Thanks to its underlying philosophy and its collaborative features, Google Apps has served as efficient vehicle to support and to further amplify this democratic learning culture, which has been established in the first session. And Google Apps has proved to be a well-

designed and reliable platform for hosting a series of participative learning activities, which center on reflection and dialogue amongst students.

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6. LIMITATIONS

The presented case study has certainly limitations. The experiences made in this particular teaching experiment have been positive and the outlined methods can be used in similar classroom settings. They are however not generalisable for considerably different contexts. Both the class size and the spatial design of the classroom are important conditions for creating constructivist learning practice. If the total number of students in the course increases above the group size of 25 to 30 participants, or even if the classroom presents itself as an fixed block of rows and benches, the pedagogical design options of teachers become already much more limited.

Web 2.0 technologies offer a number of options to help graduates to get connected to potential future employers. Final-year students can for instance create Google sites as electronic portfolios, where they present their key competences for job applications; they can use social networking services like LinkedIn to connect to communities of practitioners in work domains, in which they would like to start a career; they can subscribe to RSS feeds of business blogs and portals in Google Reader to stay up-to-date for the latest trends in different domains; and they can use Twitter feeds to get into an information flow of experts who discuss the latest business trends and developments.

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7. PRACTICAL IMPLICATIONS

An important aspect of the Google Apps class experiment is the question of its scalability within higher education courses and institutions. While the ease of use of Google Apps make it an intuitive platform, which poses only low technology competence barriers to faculty, the real challenge for a wider adoption lies the change of long-standing teaching cultures. This leads in consequence to the importance of innovators in institutions, both in faculty and in management. In this presented example, the whole content of the knowledge management course is freely accessible for all members of ESC Rennes of Business to serve as a showcase. However, an institution-wide adoption of technology-enhanced pedagogical innovation is a research topic in itself, as it requires a range of complementary measures that include faculty development as well as comprehensive technology integration strategies of the leadership (Ehlers & Schneckenberg, 2010).

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