

E-Learning and the Use of New Technologies in the 'Kolumbus-Kids' Project in Germany

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This article presents the science project 'Kolumbus-Kids' as an example of the innovative use of *E-Learning* and other *new technologies* to advance student learning and new-media education. The project benefits from various technology-based education strategies and E-Learning scenarios which are employed during the sessions, their preparation, and follow-up. Media and technology are used as instruments to improve learning and also as objects to learn about.

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Background and Introduction

Natural sciences and technology have a huge impact on all areas of today's society and have become important elements of our current cultural identity. Due to innovations in the field of media and the Internet, the use of new media and the urge to teach them in schools have developed considerably. This allows for new didactic potentials and innovative aspects of teaching and learning. If appropriate technological resources are offered and managed, the use of learning software, Internet applications like blogs or wikis, or other E-Learning scenarios can support learning as well as teaching processes and improve performance to a high degree. Consequently, transmitting competent knowledge and skills regarding a responsible use of new media is now being integrated into every school's programs.

Innovations in the media and technology sector, however, can turn working with those into a challenge for teachers. They are to develop their science and technological education in ways that are both satisfying for themselves and stimulating for their students. This article presents the science project 'Kolumbus-Kids' as an example of the innovative use of *E-Learning* and other *new technologies* in order to advance student learning as well as supporting new-media education. This method has proven to be beneficial for both university students functioning as teachers and their pupils.

The Project 'Kolumbus-Kids'

Since 2006, the Bielefeld University's 'Kolumbus-Kids' project has been working with gifted learners between the ages nine and 12. Selected students at regional schools are invited to participate in interesting sessions dealing with biological problems and phenomena at the university. These classes are designed and held by university students planning to become teachers. So far, this project is a unique concept in Germany in terms of Biology Didactics, aiming at an adequate support of students gifted in natural sciences. The project is also beneficial for the university students, as they learn about teaching methodology and diagnostics for giftedness in a theoretical seminar, followed by a practical course where they plan and give classes in the context of the project.

The combination of theoretical input and practical experience supports the university students' skills to identify student personalities and their individual needs when designing lessons and teaching units, which is a crucial competence for their future career as teachers (Borgmann & Wegner, 2011; Wegner & Minnaert, 2012; Wegner & Grotjohann, 2010). For further information, visit the project's homepage: www.kolumbus-kids.de.



Figure 1. Course participants using laptops and the smartboard in the Project classroom

The project was named after Christopher Columbus, who discovered America in the 15th century. The rationale behind the project is that the course participants become explorers, just as Columbus was, and they have to be courageous and to see beyond their own horizons in order to answer challenging questions. Throughout the project, they discover a new world of natural sciences. When working on biological phenomena, they also have to show tenacity and inventiveness, like adventurers.

What also makes the project special is its use of a variety of technology-based education strategies, new media, and E-Learning scenarios during the sessions as well as for their preparation and follow-up. On the one hand, this supports the students' and pupils' media competence. On the other hand, the use of new technologies helps the pupils achieve new scientific knowledge and functions as a tool to advance learning. Hence, media and technology are used in a responsible way in two approaches, namely as an instrument to improve learning, and also as an object on its own to learn about.

New Technologies Used in the Project

An example for technology-based education during the sessions is the use of laptops and an interactive smartboard (see *Figure 1*). Diagrams, audio files, videos, and computer animations can be shown easily on the smartboard. With the help of the smartboard, important hand-written notes or mind-maps can be saved, uploaded to electronic platforms, or archived. The videos shown are directed, recorded, and cut by the university students themselves so that they fit the purpose of each session ideally. Besides, the whiteboard enables the pupils to work on E-Learning tasks interactively and to document and visualize their results for the rest of the course. Using this digital

board is an innovative and effective way of working and learning, which is already used in some German schools. It is going to play a more important role in future school education, which is why future teachers should learn how to deal with this type of technology. The smartboard comes with voting-system software, enabling the pupils to interactively answer topic-related multiple-choice questions via remote control devices, so-called 'clickers.' This method has proven to be very motivating and effective for pupils as well as university students.

The Project's Website

The project's Website, www.Kolumbus-Kids.de, contains a variety of different informative and educational elements addressing the needs and interests of participating pupils, their parents, and university students. Apart from the course schedules, news, contact information, or reports of already finished classes, Website visitors find an innovative concept in terms of E-Learning platforms and numerous possibilities to learn interactively. The course members have the chance to watch the videos shown in the session multiple times, and their learning process is supported, as they are provided with additional material, open-source software, and a learning blog system. Besides, the blog offers pupils the opportunity to take electronic mock exams related to the course contents.

Due to the barrier-free platform on the Internet, the course members may set individual focal points and have the chance to improve their learning behavior, regardless of time and space. This computer-based learning environment is similar to that in the vocational world of natural scientists. Being exposed to these learning techniques, the pupils become accustomed to them and have the chance to learn about scientific ways of thinking and working in an authentic context. So far, this has proven to be very motivating and stimulating for the course participants.

Generally, the project's Website helps the university students to acquire scientific knowledge and to simplify and organize the preparation, realization, and follow-up of their sessions. The blog system, for instance, allows university students to exchange data, links, literature, and further information related to the project in a password-protected section of the system. Giving them a chance to share their experiences and to collect further informative material is especially important for less-experienced students. It also helps new students to get prepared for the sessions by watching the short learning videos directed by the university students. They are available for the Website for free and explain how to handle certain equipment in the laboratory, new technologies like the whiteboard in the course room, or a diversity of open-source-software programs. So far, the concept of this

Website is unique in Germany and it is constantly revised and improved.

Conclusion

Generally, the project's E-Learning concept is transferable to other projects or seminars in the field of natural science, such as chemistry or physics. It has been shown to be very motivational and effective for course participants to work with new technologies and different media during the sessions and also to have the opportunity to use the E-Learning platform whenever they prefer to use the Internet. This means of self-directed learning decreases the threats of over- or underchallenging situations for pupils, which often lead to a loss of motivation.

It is especially important to support gifted pupils in order to keep their interest alive and to nurture their talent, since future scientists will be recruited from within their ranks. Besides serving as a tool to improve the pupils' learning processes, the platform helps university students to learn about dealing with a new set of media and technology. They improve their media skills and become competent using these in their future professional lives.

Another beneficial element of E-Learning platforms like this is that they can be used at any time. The huge repertoire of material and video clips is improved and extended constantly.

The project itself offers its students and pupils an innovative technology-based program and an effective way of improving teaching and learning techniques with the help of new media.

This kind of learning environment has practical value for all sorts of education and is recommended to be used more often in universities and schools. □

References

- Borgmann, A., & Wegner, C. (2011): 'Wissenschaft 2.0 mit Kolumbus-Kids.' *Science 2.0 with Kolumbus-Kids*. *Merz-Medien und Erziehung, Zeitschrift für Medienpädagogik*, 55(3), 80-81.
- Wegner, C., & Minnaert, L. (2012): Promoting future scientists: The Project Kolumbus-Kids. *Education in Science*, 249, p. 20.
- Wegner, C., & Grotjohann, N. (2010): 'Förderung naturwissenschaftlich begabter SchülerInnen im Projekt Kolumbus-Kids.' The promotion of students gifted in natural science in the Project Kolumbus-Kids. Rostock: Wissenschaftliche Arbeitstagung des ABB e.V. 2009, Nachwuchsförderung in den MINT-Fächern—Universitätsdruckerei, 55-64.