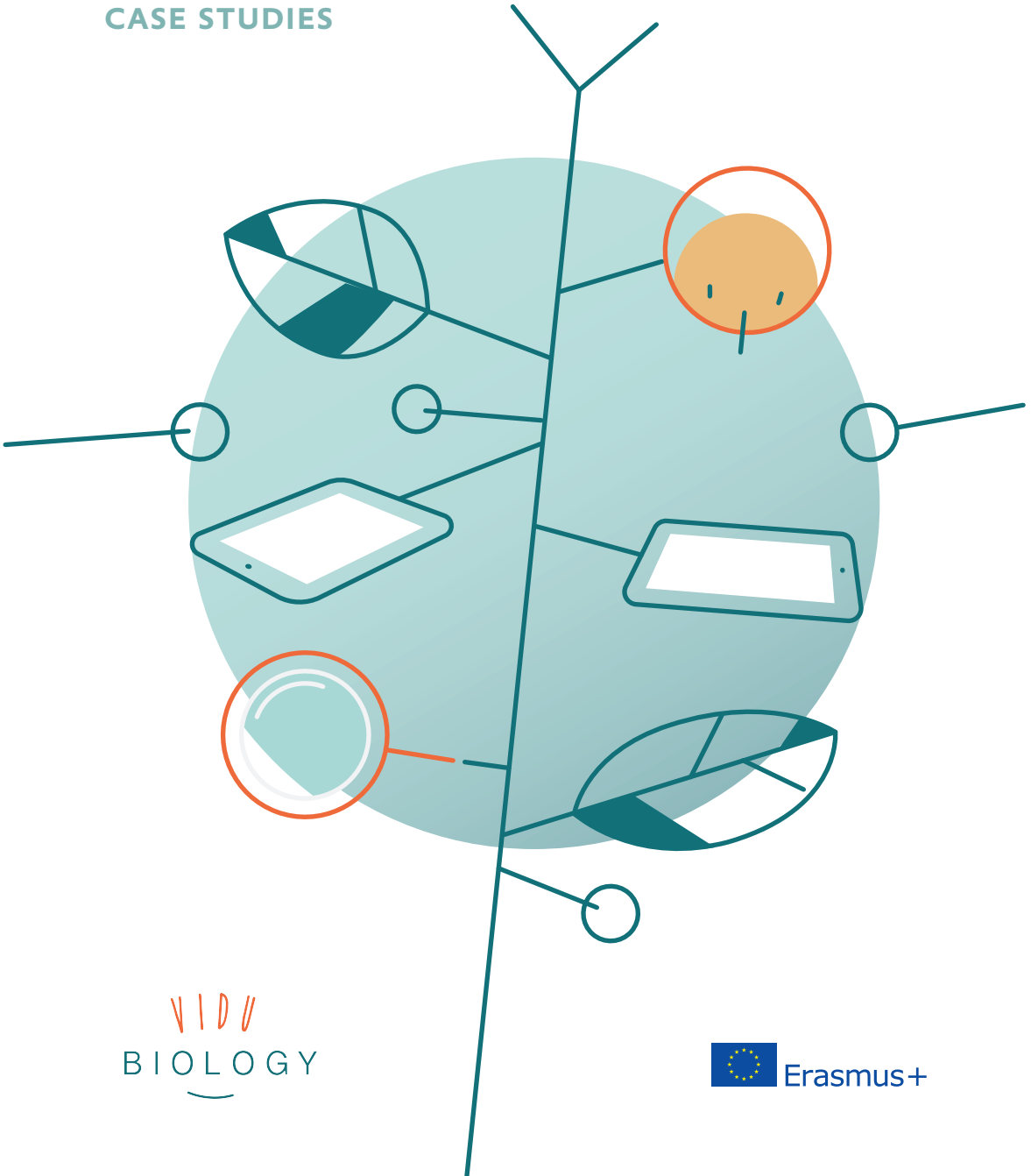
VIDUBIOLOGY

creative video for biology

CASE STUDIES



VIDU BIOLOGY

Erasmus+

VIDUBIOLOGY CASE STUDIES

Vidubiology is an EU project supported by Erasmus+ with the goal of showing teachers and their learners ways of using digital media in lessons and exploring these with them. The project team includes representatives of four EU nations – Germany, Bulgaria, UK, Iceland – from the areas of teaching methodology and school administration. The project-based teamwork focussed on developing a concept for teaching and learning which integrates photo and video technology step by step into natural sciences lessons. Beginning with simple photos and progressing on to first photo and video units and then to independent video production, learners and teachers are gradually introduced to the digitalisation of the learning process.

The following case studies will report on selected findings from the pilot lessons and in-service teacher training in the project partner nations. The core audiences of vidubiology are considered in equal measure, in order to investigate selected aspects in the context of the digitalisation of teaching:

Case Studies with the target audience 'Learners aged 9-13'

- Supporting interest and knowledge // ICELAND
- Developing social competences // BULGARIA
- Special interests in experimenation // GERMANY

Case Studies with the target audience 'Biology Teachers '

- Getting teachers on board // GERMANY
- vidubiology in the zoo // UNITED KINGDOM
- vidubiology material in a field trial // GERMANY

The vidubiology team would like to thank all the teachers and pupils involved in the pilot tests and case studies and wishes all those interested in this subject constructive and learning-full fun when implementing the project ideas and the using the materials.

Co-funded by the Erasmus+ Programme of the European Union

"It's not a yuck – it's an animal":

Using digital media to enhance interest and knowledge of life sciences among diverse students.

Kristín Norðdahl and Edda Elísabet Magnúsdóttir, University of Iceland

THE ORETICAL FOUNDATIONS

The theoretical background of the study is based on the value of using; a) practical work such as hands-on assignments or experiments which support inquiry-based learning in school curricula, b) using visual media during inquiry-based learning, c) the value of outdoor education and d) how to insure students' interest and learning in a diverse group of students. Practical work can be useful for strengthening students conceptual understanding and for stimulating students' interest in different topics (Ingvar Sigurgeirsson, 2013).

According to Bennet (2003), discussing the possible exercises in class and how to conduct them was important, both between teachers and students and between students themselves. Barker, Slingsby and Tilling, (2002) recommended that practical work should be organized so that students receive positive memories while working on the assignment, such outcome is considered to have a positive impact on the students' intellectual thinking. Practical work and inquiry- based learning is in line with Lev Vygotsky's ideas about learning. He emphasized that students emphasized that students should engage in social interaction during their studies, both with fellow students and adults. From such activity they would strengthen their vocabulary making it easier for them to solve tasks and express themselves in a more sensible way (Vygostky, 1978).

Using, cameras in students learning have been found to increase their interest and sometimes their understanding of the subject matter depending on the project focus (Tatar and Robinson, 2003). Cook and Hess (2007) found some advantages of using photographing in children's education. Children like taking photos, it can be easier to describe some phenomenon by taken photo than describing it in written language and can therefore be suitable for students with learning disabilities. The teacher can learn about what students find important. The pictures provide a basis for discussion between teachers and students.

Outdoor education has been shown to support students learning in many ways (Rickinson, et. al. 2004). In a recent study (Kubat, 2017) on teacher's views on outdoor education, the teachers found outdoor education to be a successful way in helping students to better understanding their environment. Also, in this study the teachers found outdoor education having multiple positive effects on the students, such as on their; intellectual thinking, physical health, social skills, well-being and self-knowledge.

The typical classroom in Iceland includes a diverse group of individuals with different backgrounds, cultures, interests, abilities and personalities. Teaching methods that are considered suitable for such diverse groups of students include thematic and solution-based learning as they provide flexible approach and allow for the diverse backgrounds of

students to be taken into account when solving tasks. In that way students can implement different tasks according to their ability (Guðjónsdóttir and Karlsdóttir, 2010).

OBJECTIVE(S) OF THE CASE STUDY

The objectives are to evaluate the impact of the vidubiology approach on children's interest and understanding of biological concepts with special emphasis on how valuable the approach is for enhancing the activity of a diverse and multicultural classroom.

CONNECTION TO THE PROJECT / ADDED VALUE

One of the teachers, who was supervised by two project members, wrote her master's thesis for her teacher's degree at the School of Education, University of Iceland (Ragnheiður Alma Snæbjörnsdóttir, 2019). She investigated the effect of the vidubiology method on her classroom and interviewed two other teachers´ experience of using visual media in the biology classroom according to the vidubiology approach. The focus of the study was to evaluate the impact of the vidubiology approach on children's interest and understanding of biological concepts including how the approach might affect the activity of a diverse classroom. Here, we will report on the main findings of this study.

SAMPLE

A group of 30 children in the 5th grade (10 years old) in a compulsory school in Iceland. Two secondary school level teachers from different compulsory schools, that had tried out the vidubiology approach, were interviewed for the study.

METHOD AND IMPLEMENTATION OF THE CASE STUDY

The case study was conducted during the autumn of 2018 and the spring 2019 in a compulsory school in Iceland. The vidubiology approach was implemented while teaching a 5th grade classroom where the children in the classroom had different cultural background and some children with diagnosed disabilities. The children in her class used the worksheets and other resources developed in the vidubiology project during biology classes. The children worked on two different projects connected to the Icelandic biology curriculum, first a simple introductory project based on Module 1 and then an intermediate project based on Module 2.

Multiple methods were used in the study. All participating children answered questionnaires about the visual media projects they worked on, both before and after each project. The children's projects were also investigated to look at which topics the children addressed and paid a particular attention to during the projects. These results were investigated quantitatively. Two subgroups of children from the subject group were interviewed separately after each project and the author of the thesis wrote her experience and observation of the class in a notebook. In addition, two teachers from different compulsory schools, who also had used the approach when teaching biology on a secondary school level, were interviewed separately about their experience of the project. The interviews with the teachers and the school children, including the author's own experience, were

thematically analyzed to investigate the common experience of the method by the interviewees and the author.

OUTCOME/EVALUATION

The main findings of this study were threefold.

Firstly, the study showed that the participating children generally had a positive attitude towards biology and found it enjoyable. Additionally, the children's interest in biology increased slightly while working on the project. However, the student's graded their interest in biology generally quite high before starting the project. Also, the vidubiology approach proved successful for a wider range of students compared to when they were learning from textbooks only. For example, children that deal with some difficulties such as ADHD (Attention Deficit and Hyperactive Disorder) or have a different native language could more easily participate. Importantly, the children experienced themselves as active participants in their own project as they decided what to investigate and how to present their findings to others. The interviewed secondary level teachers which had applied the vidubiology approach had the same positive experience with their students.

Secondly, using visual media was particularly useful in outdoor education. By having predefined objectives, such as finding plants in the winter or an animal on the move, helped the children to focus their attention on certain organisms or phenomena rather than going around looking for random and irrelevant objects. The approach, therefore, provided multiple learning opportunities.

The third main finding concerns children's learning from both the children's and teachers' perspective. The children did not see that their understanding or knowledge about the topic had increased after doing the project. However, the children did see that their skills in technology had increased both in taking photos and in video production. On the contrary, according to the teacher's observations in the classroom and from the group interviews with the children, it was obvious that children's knowledge had increased both regarding technology as well as biology.

As a conclusion, the project provided the children with an opportunity to learn biology and acquire technical skills in an engaging and enjoyable way. Importantly, the approach encouraged a wide range of students within the classroom to actively participate in the learning process. Therefore, the results are an important indicator of the usefulness of the vidubiology approach used in the project and indicate that students are likely to be more engaged, motivated, and ambitious in their academic work if they experience learning as fun and memorable.

LITERATURE

Barker, S., Slingsby, D., og Tilling, S. (2002). Teaching biology outside the classroom. Is it heading for extinction? Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.459.6243&rep=rep1&type=pdf

Bennett, J. (2003). Teaching and learning Science. London: Continuum.

Cook, T. og Hess, E. (2007). What the camera sees and from whose perspective. *Childhood: A Global Journal of Child Research, 14*(1), 29-45.

Guðjónsdóttir, H. & Karlsdóttir, J. (2010). Kennsla í fjölbreyttum nemendahópi [Teaching in a diverse student group]. In H. Ragnarsdóttir og E. S. Jónsdóttir (Eds.), (2010). Fjölmenning og skólastarf [Multiculturalism and school curricula] (pp. 187-205). Reykjavík: Rannsóknastofa í fjölmenningarfræðum og Háskólaútgáfan.

Ingvar Sigurgeirsson. (2013). Litróf kennsluaðferðanna [The spectrum of teaching methods]. Reykjavík: Iðnú.

Kubat, U. (2017). Determination of science teachers' opinions about outdoor education. *European Journal of Education Studies, 3*(12).

Ragnheiður Alma Snæbjörnsdóttir (2019). „Þetta er ekki oj, þetta er dýr!" Notkun myndmiðlunar til að efla áhuga og þekkingu fjölbreytts nemendahóps á lífvísindum ["It's not a yuck – it's an animal": Using digital media to enhance interest and knowledge of life sciences among diverse students]. (Unpublished master's thesis). Retrieved from https://skemman.is/handle/1946/34579.

Rickinson, M., Dillon, J., Teamey, K., Morris, M., Choi, M. Y., Sanders, D., & Benefield, P. (2004). A review of research on outdoor learning. London: National Foundation for Educational Research and King's College London.

Tatar, D. & Robinson, M. (2003). Use of digital camera to increase student interest and learning in high school biology. *Journal of Science and Technology, 12*(2), 89-95.

Vygotsky, L. S. (1978). Mind in society. The development of higher psychological processes. Cambridge, MA: Harvard University Press.

Co-funded by the Erasmus+ Programme of the European Union

Use of digital media at primary school for developing student's soft skills
potential

Yuliyana Dobreva & Biserka Zarbova, NMS Sofia, Bulgaria

THEORETICAL FOUNDATIONS

The present case study focuses on the developing of social competences and the ability to build on these competences as an effect of collaborative work of students in the application of media technologies in the vidubiology training process (photos and videos of plants and their elements).

Social competences are key to people in the 21st century. They consist of a wide range of skills, including: establishing and maintaining contacts, communicating and interacting in a group, making and adopting decisions, organizing and prioritizing of tasks in solving problems, adapting to changes, self-control and motivation. These skills help a person to start, build and maintain positive social relationships with others and achieve his/her goals. Their purposeful development today is the task of the educational system, which is relevant from the earliest age of the children (European Commission, 2012).

Changing the paradigm of teaching with the paradigm of learning, the transition to competency-oriented education necessitates rethinking and developing new values, goals, content, forms, methods, and learning tools. The process is long and takes place with successive skills upgrades, initially alongside with family influence, leading is the teacher's role as a mentor, facilitator, role model. The development of social skills requires teachers to pursue targeted actions to help students build on their ability to interpersonal communication, effective communication, active listening, empathy and understanding of the other (Kristeva, 2004). Research in this direction state that the development of social skills minimizes the risk of behavioral problems in school (and later in the workplace) and contributes to improving the welfare of children.

More information can be found in the sources mentioned at the end of the case study.

OBJECTIVE(S) OF THE CASE STUDY

This case study reflects observations on group dynamics and workflows on implementation of Module 1 and aims to outline their impact on the development of social skills in 9-10 year old students.

It comes to confirm the initial thesis that the vidubiology approach for older students is based on the combination of methods such as visualization, practical exercises, discussion, independent work and team interaction in the learning process. Media work during the sessions takes place in small groups and good cooperation is a prerequisite for emotional engagement in fruitful discussions and a lasting response from the implementation of the approach. By integrating pictures and videos into training and sharing of images, in addi-

tion to improving of the learning material studied, communication and collaboration among students are also encouraged.

CONNECTION TO THE PROJECT / ADDED VALUE

The vidubiology project enables the development of students's social skills, which adds value to its main goals, namely:

- Supporting biology education
- Using visual / media training
- Development of learning and cooperation in Europe.

The vidubiology project was presented in the spring of 2018 in the following three schools in Sofia, Bulgaria: 32 SU "Climent Ohridski", 137 SU "Angel Kanchev" and 2 SU "Emiliyan Stanev". Pilot testing of the training approach involved a total of 14 teachers and approximately 350 students (9-15 aged) from primary and secondary schools.

Feedback from teachers shows that students quickly orient themselves in their task and successfully use technical tools in the process of implementation.

The teachers emphasize the significant effect of the approach to developing the students' communication skills and their cooperation as well as to stimulating their autonomy from the teachers.

SAMPLE

This case study presents observations from the pilot testing of the vidubiology approach at 137 SU "Angel Kunchev", students from 4th grade / 9-10 years / in May-June 2018. The participants were 140 students.

Primary education level students learn biological topics in other subjects, so visualization is used in biological subjects in the "Man and Nature" and "Environment" classes.

METHOD AND IMPLEMENTATION OF THE CASE STUDY

Students had a lesson on "Nature around us" and a task for beginners in learning. They worked in groups of 7. The grouping was done by the students themselves, following their own preferences and teamwork experience, choosing their partners on the basis of mutual understanding and sharing of common interests.

The learning process went through several logical steps. Initially, the students met the worksheets describing objectives and tasks, basic instructions and guidelines. Students had one weekend to learn about the proposed tools and to explore and test their capabilities. Then they presented their impressions of the proposed apps and argued why they preferred one or another among them. For the most appropriate, they announced FilmoraGo, training each other to use it. In the introductory part, the teachers explained to their students the task of filming with their personal smartphones and/or tablets selected details of natural objects or phenomena. They gave them guidelines and examples on how to use Zoom. In the form of a discussion with students, teachers defined the following steps to accomplish the task in groups:

- Discussing rules for working together and planning the sequence of actions to accomplish this task.
- Discussion of potential objects for taking pictures and making decisions - discussing which element of the surrounding nature is of interest to them (in the process most teams changed the subject of their research and the object they were filming because they went "on the ground" finding more interesting objects from the originally designated).
- Experimental photos to master work with the app and various shooting techniques.
- Photo capture of the selected objects (individual and group).
- Review of the photos taken and selection of 7 of them - most relevant, interesting and relevant to the task.
- Preparation of a presentation of the results of their work. A deadline of 3 weeks for the task was set.

After this introduction, students were allowed to work in groups to plan and organize their work. During this first discussion, they discovered new features on their phones and decided in the next three days to look for other applications they could use. By their ideas, groups were created in Viber, which included teachers with the aim to keep in touch, to exchange information and ideas, and subsequently to take pictures. The number of photos (minimum and maximum) that each student presents was also determined in the different groups.

Teachers encouraged them to make a plan of work and try to assign tasks, as well as assigning a group supervisor to follow up the task and address the teacher in the event that any questions arise. Groups have set a time to meet at school and also use breaks to discuss and shoot together.

After the group making pictures, discussions were held on the collected material for visualization and 7 photos were selected by a participant. Each group prepared a presentation to present to others. During the presentation of the final products, each team had to briefly present their work and the other teams had to give meaningful and constructive feedback, which always started with what was best done, necessarily required brief advice on what could have happened better and ending with a positive assessment of the work of the children in the team Impressive was the wave of positive emotions at the premiere of the movies. There were applauses after each video. Students were congratulating each other for their work.

OUTCOME/EVALUATION

Students have been involved in the process, being active, motivated and excited. The joint work on the task was observed and stimulated by the teacher directly in the course of group discussions and analyzed post factum. The effect of improving social skills as a con-

sequence of the interaction between students in the process of working on the task can be outlined in the following aspects:

Enhanced skill	**Improvement indicators**
Intensifying and optimizing communication between students	– An expression of interest in a collaborative, attractive work task and its discussion; – Active questioning - open and closed form; – Discussing ideas, rules, relationships, products from collaborative work (photos and videos taken); – Hearing the opinion/suggestion of the other in the discussion process; – Presenting own ideas and giving supporting arguments; – Self-determination in discussions, autonomy; – Giving and receiving feedback on individual steps/stages of task execution and on the results achieved - individually and on a group level.
Collaboration and mutual assistance in accomplishing the task	– Involvement of all group participants in the task and assignment of roles and responsibilities; – Manifestations of tolerance towards different viewpoints; – Providing assistance in encountering difficulties and accepting suggested one; – Making a decision through group discussion, using brainstorming; – Achieving consensus.
Skill to organize	– Organizing and planning the steps to accomplish the task; – Compliance with accepted rules; – Sharing roles and responsibilities; – Activity in search of additional information and teacher assistance; – Setting deadlines for implementation and adherence to compliance; – Creativity in choosing objects, position and focus for the photo; – Initiative and activity to find new mobile applications.

A further benefit is a deferred effect. During the pilot phase, these students were at the end of the fourth grade and in the autumn they went to higher education degree. In the autumn of 2018, their teachers, who began the new school year of first grade, created the

conditions for sharing their experience with the new first-graders. This form of P2P training promotes continuity in school and communication between different age groups.

The Bulgarian teachers prioritized the development of social skills and improving relationships between students and their ability to work together. The project stimulated contributed to a good mood, satisfaction and positive energy in the class. The sharing of the results also strengthened the communication of the parents. In the class students's activity and motivation increased. Also their creativity, observation skills and analytical thinking were stimulated. Students gained a better understanding of and fresher outlook into biology. It was a benefit to help and ecological values.

The Bulgarian teachers commented that the project stimulated students' social skills and improved relationships between students and teachers. This is important in the discussion in the children use of media isolating them and decreasing their communication and interaction and negatively influencing their social skills. The project also shows that the media tasks can inspire further creativity. Undoubtedly, the vidubiology approach is suitable for use in teaching subjects with biological content to 9-10 year old students not only to improve their academic performance and to stimulate their motivation to learn but also as a tool for developing their social intelligence.

LITERATURE

European Commission (2012). Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions. Rethinking Education: Investing in skills for better socio-economic outcomes. Strasbourg. Retrieved under: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0669&from=EN (10.10.2019)

Kristeva, A. (2004) Formation of social skills in students - a task of the new education.

RECOMMENDED LITERATURE

Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. New York: Basic Books.

Gladwell, M. (2009). Outliers: The Story of Success. London: Penguin Books.

Goleman,. D. (2007). Emotional Intelligence, New York, United States

Weare, K. (2010). Mental Health and Social and Emotional Learning: Evidence, Principles, Tensions, Balances. Advances in School Mental Health Promotion. 3, 5-17.

Co-funded by the Erasmus+ Programme of the European Union

"Learn better because it is fun and simple" - The influence of digital media on interest in experimentation.

Monique Meier & Marit Kastaun, University of Kassel

THEORETICAL FOUNDATIONS

The use of digital media (mobile phones or tablets) for communication and research is almost indispensable in our everyday lives. In the same way digital media offers great potential to education. It enables an excellent potential to individualise the learning process (Irion & Scheiter, 2018) or increasing cooperative learning amongst others (Tutty & White, 2006). Exploratory studies have especially shown that the use of digital media, for example in German lessons, affects motivation but only if the medium is integrated constructively in the lesson and it is student centred (BITKOM, 2011; Schaumburg, Tschakert & Blömeke, 2007). However, the motivational effects of digital media in complex learning situations, in which digital media offers the learner a different or new approach to subject specific content, has had little research. A variety of approaches to teaching and researching can be created by integrating the use of digital media into biology specific methods and knowledge, including experimentation and how they affect student interest.

OBJECTIVE(S) OF THE CASE STUDY

This case study is targeted at middle school students' interests and conducts an analysis of them. Primarily it focusses on the effects of digital media on the interest of students while they are conducting biological experiments, but not on how the digital media is used. Since digital media is tightly bound to the students' everyday lives and free time, it is clear that working with digital media is an interest. The question arises whether digital media not only positively influences interests in general, but also fosters an interest in learning more complex content. Consequently, digital media does contribute to learning success.

CONNECTION TO THE PROJECT / ADDED VALUE

In this case study, the concept and material from the vidubiology module 3 "Creative Videos" are used in an inquiry based teaching structure. Students conducted an experiment using video techniques as described in module 3 and photography techniques from module 1.

SAMPLE

The study was conducted in North Rhine-Westphalia, Germany, in an integrated school. N=97 students from grade 5 participated in this study. While three of the five classes (n=61) participated in the vidubiology class the two comparison groups (n=36) conducted the same experiment but without the use of digital media.

METHOD AND IMPLEMENTATION OF THE CASE STUDY

During a 4 hour project teaching unit, students were asked to look into the morphology and behavioral of a Giant East African Snail. To do the research, the students were encouraged to find out whether the hand-sized snails have olfactory senses (smell) by conducting an experiment. The students worked in small self-organizing groups. Using a knowledge method, each group was asked to form hypotheses around the question "Snails have no sense of smell because they do not have a nose. / Yes, snails are able to smell their food because their eyes are small". They had to plan an experiment that tests their hypothesis, then collect data and evaluate their observations.

The vidubiology-classes worked with selected apps on a tablet during the exploration, planning and evaluating phases and how they would create a video at the end of the experiment. Whereas the comparison groups explored the snails with magnifying glasses and created a poster about their experiment.

Before and after the four hour teaching unit the students had to fill out a questionnaire that measured the students' interest in biology as a school subject with four items ("Biology is fascinating/ exciting.", $\alpha = .81$), as well as the interest in experimenting with two items ("I would like to conduct experiments in the lessons more often", $\alpha = .72$, adapted from Wilde et al., 2009) on a Likert scale (1= I strongly disagree – 4= I agree fully). Additionally, the students were able to state their opinion on the learning effects of the technique/ method. They were also able to give feedback on the teaching unit in general. The data was evaluated descriptively.

OUTCOME/EVALUATION

When assessing whether taking photos and videos was helpful for learning, the students of the vidubiology classes very clearly stated that they had had fun learning and using the technology. For 20 % of the students ($n = 59$), the fun factor was a central element in their learning process "You have learned something and it was fun", student, 10 years old; "You learn more easily because you had fun", student, 11 years. The learners of the comparison classes also give positive feedback on creating posters in the learning process and/or on their learning, but did not include fun in their reasoning (2 % if $n = 31$). A central question which arises with digital learning in scientific work is whether the fun factor in using digital media is transferred to an interest in the subject and the content to be processed.

To what extent can interest in biology and experimentation be promoted by using a project using digital media techniques?

Students who were, at the beginning of the lesson blocks, were also interested in biology ($N = 97$, $M = 2.95$) and the experiment was seen as very interesting ($N = 97$, $M = 3.62$). The existing interest could be promoted further through the use of photography and videography in the experimental investigation of the smell sensors of giant snails. Significantly,

the students in the vidubiology classes have a higher level of interest after completing the digital lesson (median = 3.25) than before (median = 2.75; asymptotic Wilcoxon test: z = -4.91, *p* =. 000, *n* = 60). The Interest in experimentation was also significantly increased among the students of this sub-sample, z = -2.35, *p* = .019, *n* = 60. In the comparison classes, this effect was not seen among the students. In terms of both subject and factual interests, there is no significant increase before and after the teaching sequence without digital media.

To summarise - it can be said for the students that digital media has enriched the learning process from the students' perspective. In their feedback, the students particularly emphasized how they got closer to the organism, the African giant snails, by taking photos and videos and that they learned about these animals. The data and findings obtained here should be interpreted carefully with regard to the different sizes of the partial samples in the digital and non-digital classes taking on board the novelty effect (Kerres, 2002) that occurred amongst the students of. As the students had little experience with digital media at the time of the case study, the lesson turned out to be something very special for them.

It is quite rare that the special features and the fascination of using digital media are used in the classroom and therefore it creates more interest. In order to promote long term interest in media, care should be taken to ensure that the motivation associated with it is not awakened solely because of the technical innovation of the medium, but through the use of different media techniques and the associated promotion of different media skills (Bertelsmann Foundation, 2014). The vidubiology project is pursuing this approach by embedding digital techniques in a more didactic and long-term manner over three modules with increasing degrees of sophistication and skills in the respective lesson units. An embedding in the curriculum would be desirable here and, according to the opinion of the participating teachers who observed their classes in the piloting (2018-2019), could easily be implemented with the simple technology required (Meier et al., 2020).

LITERATURE

Bertelsmann Stiftung, (2014). Wie wirksam sind digitale Medien im Unterricht?, https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/GauePublikationen/Studie_IB_Wirksamkeit_digitale_MMedie_im_Unterricht_2014.pdf, (Download 11.10.19), Gütersloh.

BITKOM Bundesverband Informationswirtschaft, Telekommunikation und Neue Medien e.V. (Hrsg.) (2011). Schule 2.0 – Eine repräsentative Untersuchung zum Einsatz elektronischer Medien an Schulen aus Lehrersicht, http://www.bitkom.org/files/documents/BITKOM_ Publikation_Schule_2.0.pdf (Download 11.10.2019), Berlin.

Irion, T., Scheiter, K. (2018). Didaktische Potenziale digitaler Medien. Der Einsatz digitaler Technologien aus grundschul- und mediendidaktischer Sicht, Grundschule aktuell 142, S. 8-11.

Kerres, M. (2002). Bunter, besser, billiger? Zum Mehrwert digitaler Medien in der Bildung Why? On the Benefit of Digital Media in Education. Informationstechnik und Technische Informatik, 44(4), 187-192.

Meier, M., Kastaun, M., Norðdahl, K., Magnúsdóttir, E., Snæbjörnsdóttir, R.A. & Hottmann, A. (2020). Blütenpflanzen im Rampenlicht - Konzept und Material zur Integration von Foto- und Videotechnik in den Biologieunterricht. *MNU Journal, 1*, 62-69.

Tutty, J., White, B. (2006). Tablet classroom interactions. From the Eight Australian Computing Education Conference, Tasmania, Australia.

Schaumburg, H., Prasse, D., Tschackert, K. , Blömeke, S., (2007). Lernen in Notebook-Klassen. Endbericht zur Evaluation des Projekts „1000mal1000: Notebooks im Schulranzen. http://www.kranich-gymnasium.de/notebook/n21evaluationsbericht.pdf (Download 11.10.2019).

"Getting teachers on board"

- overcoming potential obstacles for teachers for biology based media projects

Armin Hottmann, Kulturring in Berlin e.V.

THEORETICAL FOUNDATIONS

The following case study explores questions from teachers which came up during our four key European training workshops. vidubiology is a combined media education and biology project but also relies on project based learning. Within these layers it is understandable that questions for teachers can arise that the project will need to have answers for.

For many years Kulturring have been involved in media education where, especially, video production is used as a tool to motivate students to reflect more on media messages in general. Students themselves use a production based approach to find out more about a school subject. Within this process they learn how to reflect on what they produce, during the production process, and also when the project results are shown and discussed within the class.

vidubiology is in line with recent requests that more media engagement needs to be a part of education ("No education without media", Niesyto in Pirner., Pfeiffer & Uphues, 2013). But the media application will only ever be as good as the educational thinking on which it is founded (Gutierrez & Hottmann, 2011, p. 38). Video education is not a vocational training programme. Teachers do not have too have a high technical competence, as students are normally confident in this area. Teachers need to focus on the learning they want to achieve, in the context of vidubiology in both media and biology.

Students produce videos themselves with the guidance of their teachers. This is where project based learning is a useful framework. Project based learning is a student centred pedagogy, where they learn on their subject for a certain period of time, investigate and respond to questions, challenges or problems (https://en.wikipedia.org/wiki/Project-based_learning). It is based on a "learning by doing approach" where students experience projects in a social and product orientation (Gudjons, 2001).

OBJECTIVE(S) OF THE CASE STUDY

The main objective of the case study is to gain insight into where potential obstacles with the project approach might exist and where the project design could be improved to make vidubiology more accessible and increase learning with media and biology.

CONNECTION TO THE PROJECT / ADDED VALUE

The case study is in line with the goals of the project. Improving the quality of the project design will mean that a greater audience of teachers can be reached.

SAMPLE

Material / evidence was gathered from the four core teacher training workshops where the EU vidubiology project was presented:

- Sofia, BG: June 2018 – "Trees in Sofia"
- Chester, UK: October 2018 – "Adapting to the environment"
- Reykjavik, IS: April 2019 – "The arrival of spring in the neighbourhood"
- Kassel, DE: September 2019 – "Plants and snails in the spotlight"

The workshops were between two and seven hours long.



METHOD AND IMPLEMENTATION OF THE CASE STUDY

The case study is based on participative observation (Lüders in Flick von Kardoff & Steinke, 2000) and dialogue / interviews (Hopf in Flick von Kardoff, & Steinke, 2000), which has taken place during the four vidubiology training workshops. All was done in an informal way and was very much based on what the author has perceived from his own perspective.

Participative observation: taking part and engaging in the process has offered insight of how teachers have taken the vidubiology ideas on board, how they implemented the project themselves and also of how they took the ideas further. Key observation points were:

- Observing the approach to ideas (responsiveness to the task)
- Observing the handling of technology, potential issues (need for support)
- Observing team work / collaboration during the task (time required)
- Observing the overall satisfaction during the process

Dialogue / interviews with the teachers: notes were taken of questions or comments from the teachers that arose during the workshop. Although no additional questionnaire for this case study were used during the workshop, ideas were collected from a number of sources:

- Questions arising at the initial workshop stage of presenting the project and workshop task (understanding goals and workshop task)
- Questions during the implementation stage (brainstorming, planning / storyboarding, production, preparing for presentation)
- Questions during the presentation stage (presenting of project process and results)

Statements made by participants and partners after the workshop (including video interviews).

OUTCOME/EVALUATION

Teachers worked enthusiastically on the vidubiology ideas and creatively developed initial ideas further but also expressed concern about the approach and a potential implementation in their individual teaching settings. As many previous teacher training workshop in the area of media education and production have shown – it is very helpful to sit together and take time to listen to concerns teachers have and help to find answers to their questions together.

Many teachers who joined the workshops had rather less experience with practical video work within the biology classroom. Therefore a lot of the concern expressed dealt with the area of technology and production. Further issues included the time needed for such projects and the area of learning / combination of media and biology.

Issue of technology: One of the teachers at the Chester workshop stated that she will not be able to participate in the practical part of the workshop - "I can't even use own my mobile phone". As it turned out she quickly got into taking photos and recording short video clips after a short introduction. A basic knowledge of the level of expertise or lack off digital media technology, of the individual teacher, is needed in order to oversee and moderate media projects. The students are normally confident and often advanced with the media technology and production.

One teacher during the Sofia workshop mentioned that video production just looks too complicated. When going through the different steps some of the reservations disappeared. The way the modular task is designed to enable an initial easy entry that requires no video editing and concentrates on taking photos, lowers the barrier. Teachers can start there and progress with the next module once they feel confident with the basics (Norðdahl et al, 2019, p. 15).

"I don't have enough technology at my school" – many teachers mentioned that their schools have very limited hard- and software. Our pedagogical material describes how vidubiology can be completed with all sorts of digital technology, even technology which is quite a few years old. At the same time it has become clear during the project that current mobile devices, especially tablet computers, help the productiveness and time needed to work on the tasks (Loviscach et al., 2017, case studies, p. 22). They are also popular technologies for the students (teacher interview Warburg: https://youtu.be/1zkUYj6RiT0).

A teacher from Iceland has also taken this on board, "In my opinion using the technology was the strongest part of the project. The children were mostly secure about that and those that had some problems with it got more confident after using the technology" (Norðdahl et al, 2019, p. 36).

Issue of time: One of the key hesitations with media work in education is the fear of needing even more time for already busy work schedules. "I am already struggling with my teaching load" was mentioned and this has come up more than once. Project work (not just media project work) is often seen as too much additional work and the additional learning skills such as joint investigation and production are often not seen.

The project based learning approach offers good structures for team work. But in combination with media production things could get complicated. One of the teachers in the Kassel workshop commented positively on the modular approach (https://youtu.be/-

x6Ugr1Zk0s) with the option to start with easy tasks which need little time. Many of the less experienced teachers worked with the entry task during our workshops and were motivated to try it out with their own class afterwards.

"The post production takes too much time" mentioned by a teacher during the Sofia workshop but she also told us how she herself went about it. Because of limited classroom time students continued working afterwards and did the postproduction as their homework and brought their results back to class for presentation.

Issue of learning: "Does this media approach help learning at all?" is a valid question which has been mentioned during a European project presentation. There has been a discussion about media production in schools for decades, because media education involves a different kind of learning taking place. The media tasks are there to motivate, to bring in support for biology learning and to help with media competence.

"Is this then only about media production?" There was concern with a few teachers that students might get carried away with the media production and forget about biology. "How do you rate the learning in terms of biology and media production?" One of the teachers from the Warburg 2018 piloting responded that students learned about both – exploring flowers and getting familiar with media production. She also mentioned where the use of a camera has opened student's eyes to the number of flowers in their neighbourhood, or that one student mentions that because of the project she is no longer afraid of insects (https://youtu.be/1zkUYj6RiT0).

Other issues concerned the learning potential of project based learning. One teacher mentioned that she was afraid that learning was harder to track with the students working autonomously. Gläsel (2018) mentions even a fear with some teachers using media production of "losing control". This was not reported back to us within any of the vidubiology projects but it is important to have a clear task design so that both students and teachers are confident of what is expected of them. Then the additional benefits of a project based learning approach can bear fruit – investigating together, becoming independent and experiencing team work.

Most of the teachers have understood the media education perspective of the project – that a reflective media production can help to support the media competences of the students.

To conclude: We are thankful for all the feedback from teachers we received during our vidubiology workshops. It has been helpful to improve the project content but especially the task design. The feedback has also helped to improve the project presentations – presenting answers for potential hesitations upfront.

Ideas need to be practical but also clear (in design and content) and learning benefits communicated clearly. The feedback from the teachers was taken on board when the handbook was written and for the revision of the task sheets.

LITERATURE

Flick, U., von Kardoff, E. & Steinke, I. (eds. 2000). Qualitative Forschung – Ein Handbuch. Hamburg: Rowohlt.

Gläsel, A. (2018). 6 reasons why teachers don't use technology in the classroom – what can EdTech companies learn? Medium.com, the edtech world: https://medium.com/the-edtech-world/resistance-tech-classrooms-981b86d862fc (retrieved 22.12.19).

Gudjons, H. (2001). Handlungsorientiert lehren und lernen – Schüleraktivierung, Selbsttätigkeit, Projektarbeit. Bad Heilbrunn: Klinkhardt.

Gutiérrez Martín, A. & Hottmann, A. (eds., 2011). Video Education, Media Education and Lifelong Learning - A European Insight. Berlin: Kulturring in Berlin e. V.

Loviscach, J., Thiel, O., Hottmann, A., Vaz Rebelo, P., Kostova, N., Josephson, J., Jessat, M. & Vaienti, D. (2017). vidumath – creative video for mathematics. Berlin: Kulturring.

Loviscach, J., Thiel, O., Hottmann, A., Vaz Rebelo, P., Kostova, N., Josephson, J., Jessat, M. & Vaienti, D. (2017). vidumath – creative video for mathematics: Case Studies. Berlin: Kulturring. http://vidumath.eu/wp-content/uploads/2017/12/vidumathCaseStudies_EN.pdf

Moser, H., Grell, P. & Niesyto, H. (eds., 2011). Medienbildung und Medienkompetenz – Beiträge zu Schlüsselbegriffen der Medienpädagogik.

Norðdahl, K., Magnúsdóttir, E., Meier, M., Kastaun, M., Hottmann, A., Bushnyashki, Y., Dobreva, Y. & Josephson, J. (2019). vidubiology – creative video for biology. Berlin: Kulturring.

Pirner, M.L., Pfeiffer, W. & Uphues, R. (eds., 2013). Medienbildung in schulischen Kontexten – Erziehungswissenschaftliche und fachdidaktische Perspektiven. München: kopaed.

Co-funded by the Erasmus+ Programme of the European Union

Extending vidubiology through a teacher training workshop at a zoological facility (zoo)

Joel Josephson, Kindersite UK

THEORETICAL FOUNDATIONS

Learning and teaching outside of the school buildings, are a common characteristic of biology lessons. Seeing nature in realityand establishing a connection to it, is essential for a life that is in tune with nature. To consider something as worthy of protection is intrinsic to knowledge about it. Places and institutions that foster learning outdoors make a great contribution to the building of knowledge. For example, zoos can be very helpful in developing environmental awareness in the interaction between animals and students (Clayton, Fraser & Burgess, 2011). For this reason, one approach in the project work was to transfer the concepts of vidubiology into a teaching-learning sequence in a zoo and pilot the ideas with teachers.

OBJECTIVE(S) OF THE CASE STUDY

The case study looks at how a teacher/specialist training workshop at a zoo can be organised to extend the possibilities of the project in to additional and engaging areas. It describes how a specialized biological resource, in this case a Chester zoo, was used to provide biological facilities and environment that would increase and focus, the possibilities for using the vidubiology project.

CONNECTION TO THE PROJECT / ADDED VALUE

The workshop has been centered on the core ideas of the project, using media education in a scientific subject area, and extrapolates the ideas in to a very rich biological environment that is not found in the classroom, or the close environs of almost all schools.

SAMPLE

This case study presents observations from the teacher/specialist workshop held in Chester Zoo (the most visited zoo in the UK) with 12 teachers from primary and secondary schools in autumn 2018 for 3 hours.

METHOD AND IMPLEMENTATION OF THE CASE STUDY

A zoological facility of any size or scope offers access to fauna in a variety and scope that would otherwise not be available. This is very much the case with Chester zoo, that has over 500 species of animals and 25,000 individuals. The species cover every major Class of animal. The animals are also kept within carefully designed replicas of their natural habitats, from tropical forests, desert, plains etc. With the addition of many water-inhabitants in a water-based environment.

The variety and richness of a large zoo, such as Chester, permits the project to not only look at characteristics of a single species but also allows comparisons between different species, such as convergent and divergent evolution, differing adaptations,. Further comparisons can be made across diet, habitat, behavior, activity etc. These observations can also include specific studies of a single species.

This possibilities go much further than existing possibilities that have been developed within the vidubiology project that are based on activities and fauna and flora available within easy reach of a classroom.

The possibility of a teacher workshop at Chester zoo, required the project team to carry out the following preparations for the workshop to extend their existing areas to the possibilities of the zoo:

1. Meetings with specialized educationalists at Chester zoo.
2. Researching what animals are available in the zoo.
3. As the zoo is extremely large in area, what animals are available within the immediate vicinity of the 'Educational facility' where the workshop would take place'.
4. After communicating the above details to the project team enabling a detailed discussion on the exact areas that the workshop would focus on.
5. A detailed discussion and finalization of the exact questions workshop attendees would be asked to work on.
6. Preparation of the questions for attendees and presentations and explanations by the project team of the workshop tasks.

The above process resulted in a brief being given to attendees on the day (if applicable, link to the homepage), attendees could choose which area they wished to follow:

- Study an animal's physical adaptation that makes them successful in their environment**'.**
- Take photos of related animals which have visibly different morphology, i.e. difference in body part proportions and coloration.
- Take a video of the animals you chose in part 1). The aim is to investigate how these animals move and how their movement might make them successful in their environment.

The attendees were given one hour to film in the zoo.

The actual workshop was organized in 4 parts:

1. Presentations and explanations about the vidubiology project. Explanation about the workshop.
2. Teachers forming groups, and with a member of the project partnership, going in to the zoo to complete a video within the workshop brief.
3. Returning to the Learning centre and editing their video.
4. Showing their videos to the groups and reflecting on the workshop and what has been learnt.

OUTCOME/EVALUATION

The major outcome of the study is the additional area of resources that have been added to the resources available on the vidubiology website that describe how any external zoological facility can be used within the project.

In addition, participants of the workshop completed evaluation forms and some remarks are included here:

- The zoo was a perfect location to show the value of using video in science
- I do believe this approach can be integrated in to the biology curriculum
- The workshop gave me another teaching tool that can make disengaged students, finally engaged.

Enhanced skill	**Improvement indicators**
Understanding how to use video in the biology classroom	The comments from teacher attendees showed clearly that they valued the approach and particularly ways that media can be used as effective toold for teaching. The zoo also offered additional ideas of what can be done with vidubiology and extended the projects scope
Collaboration and mutual assistance in accomplishing the task	Involvement of all group participants in the task and assignment of roles and responsibilities; Manifestations of tolerance towards different viewpoints; Providing assistance in encountering difficulties and accepting suggested one; Making a decision through group discussion, using brainstorming; Achieving consensus.

LITERATURE

CLAYTON, S., FRASER, J. & BURGESS, C. (2011). The Role of Zoos in Fostering Environmental Identity. *Ecopsychology, 3:*2, 87-96.

Teachers' selection and evaluation of teaching materials – practical trial of vidubiology material

Monique Meier & Janne-Marie Bothor, Kassel University

THEORETICAL BASIS

The whole presentation of teaching is subject to the influence of the use of digital information technologies. The number of digital Open Educational Resources (OER) is constantly increasing. A market analysis from 2016 identified over 600.000 free teaching materials available online (Neumann, 2016). It was revealed that of the teachers asked, 89% had used free teaching material from the internet – for suggestions for their own teaching (84 %), for working with tasks (55 %), for creating current references (53 %) (Neumann, 2015). The vast number and range of digital educational materials raise new questions about quality assurance (Brückner, 2018) and about demands on the professional knowledge of teachers, who are presented with the challenge of evaluating the quality of the teaching material and considering any legal requirements that these bring (Neumann, 2015; UNESCO, 2019).

GOAL(S) OF THE CASE STUDY

The dissemination of vidubiology's concept and the materials takes place primarily via the internet, as is usual for OER material. Therefore, as well as the appearance and presentation on the homepage and the links to social media platforms, the material itself also needs to be attractive from the perspective of the user. But how do teachers decide what constitutes good OER teaching material? *On what criteria are their choices of pre-prepared materials from the internet based and, ultimately, how do they use these in their own lessons?* This case study was carried out with the goal of gaining a first impression of the user profile of OER material in general, and then, more specifically, of vidubiology material and its perceived quality.

CONNECTION WITH THE PROJECT / ADDED VALUE

The central products of the vidubiology project are the materials which are evaluated by pupils and teachers in the project partner nations. They consist of pupils' materials, teachers' materials, video tutorials, examples from pupils, etc. As well as feedback about the implementation of these materials and the concepts, it is also helpful for further development to evaluate the material itself. Teachers need to be able to use the information in and about the material in order to implement it into their teaching. Results from this case study shed light on the quality of vidubiology from the perspective of the user: the teachers.

SAMPLE

There are a total of N = 11 teachers (f = 55 %) included in the case study who teach biology, as well as other subjects. For a partial sample of n = 8 teachers there is data about the

general selection of OER teaching material as well as the evaluation of vidubiology material. The case selection followed a qualitative sampling plan which included the distinctions: Number of years in the profession (0-10, > 10 years), Sex (m, f), Grade level (lower secondary, upper secondary), Frequency of digital media use. The following cases can be recorded:

- *N* = 3 young teachers (f = 33 %) with < 5 years of teaching and a high frequency of digital media use (several times a week – daily), in lower secondary (*n* = 1) and in lower and upper secondary (*n* = 2)
- *N* = 5 teachers (f = 60 %) with > 10 years of teaching (*M* = 13 Jahre) and a high to medium frequency (*n* = 2) and medium frequency (*n* = 3) of digital media use, in lower secondary (*n* = 2) and lower and upper secondary (*n* = 3)

The composition of cases sample has the goal of gaining a first view of the many-sided user profile of OER material. 50 % of those asked knew the vidubiology project via contacts to project partners or from an in-service teacher training event.

METHODS AND IMPLEMENTATION OF THE CASE STUDY

This involved a questionnaire which respondents completed online. The average time taken for this was 30 minutes. In order to be able to characterise the different instances of the study as well as to differentiate between them, the first part asked about socio-demographic data (among others: age, sex, teaching subject, professional status) as well as a self-evaluation of digital media use (frequency and competence). The second part dealt with the behaviour and activities of the teachers when searching for and using pre-prepared teaching materials, with and without reference to digital technology. Teachers gave estimates about seven items (Likert Scale 1 (-) to 4 (+)). The questionnaire ended with an open, central question about the characteristics of good teaching materials which also enable the integration of digital technology into teaching. The third part was devoted entirely to the evaluation of the vidubiology material (module 1). The feedback and assessment were recorded using open items in a free answer format (10 items).

The evaluation of the controlled items was descriptive. The answers to the open items were summarised according to content and then organised in such a way as to present a qualitative judgement about the vidubiology material.

RESULTS / EVALUATION

The teachers/cases included in this study are already open to using digital media and already employ these in their teaching. According to the six competence levels of the European Digital Competence Framework for Educators (DigCompEdu, Redecker & Punie, 2017) the respondents preponderantly classify themselves as Insiders (Level 3, B1, 46 %) and Experts (Level 4, B3, 36 %). As a result they include investigating teaching material for digitally supported lessons in their lesson preparation (high level of agreement, *M* = 2.64). Teachers use and include pre-prepared teaching materials selectively, which means they primarily take parts of the material and adapt it for their own teaching. The respondents rather rejected a one-to-one implementation of pre-prepared teaching material (*M* =

1.64). Material for digitally supported teaching therefore has rather the role of idea generator to be then adapted into the teacher's own lessons (*M* = 3.36). This user behaviour explains the answers to the question about the characteristics of good, pre-prepared teaching material. The answers given can be structured qualitatively into three categories of teaching material:

⇒ Options for differentiation (45 %)
⇒ Customisable / Transferability (45 %)
⇒ Pupil activity (27 %)

Teachers consider pre-prepared teaching material to be practicable if it *"offers options / forms for differentiation"* and if it can be used flexibly, i.e. *"it can be customised and transfered and adapted"*. Materials that can be adapted to a particular group of learners, that can be freely used and which have options for differentiation can be integrated constructively by teachers into their own teaching setting. Regarding teaching materials which include the explicit use of digital media, these need to be easily implementable, i.e. *"free use of apps"* and applications which function independently of any platform. Additionally respondents expect some added value from using digital technology, for example via *"various forms of approach for pupils (auditory, audio-visual, text, graphics etc.)"* The uses and selection criteria described therefore present the following question:

How do teachers evaluate the presentation and the usability of vidubiology material (Module 1)?

With regard to the self-defined criteria for pre-prepared teaching material 75 % of teachers (*n* = 8) considered the vidubiology material for module 1 to be consistently positive. Appealing design, the activating of pupils, applicability and didactical implementation, supported by *"helpful background information and tips for teacher implementation"* are especially highlighted. The additional benefits of *"in comparison with working with a book"* and the possibility for *"differentiated implementation"* are also cited. The focus on lower secondary is considered to be a limitation, although the technology or rather the digital material (video-tutorials) can be used in upper secondary, the materials are rather less suitable.

In the cases of young teachers three approaches to additional improvements or extension of the vidubiology material can be summarised. The areas of the subject, teaching methodology and techology are addressed. Subject-specific information should be expanded. This argument is supported by remarks about a case with over 10 years of professional experience. *"Content suggestions and content materials for pupils"* are very clearly indicated as missing. Concerning the area of teaching methodology, which is also represented by one case from both samples, the following are cited: increasing the options for differentiation by using more open formulations and differing tasks as well as the level of digitalisation for individual learners. Elements for further specialisation regarding technology are cited only from young teachers or rather from one case of the sample. Currently there is only a low threshold for the inclusion of smartphones as a tool for photos. Here smartphone-functions and technical and software-based tools, such as lenses for mobile phones and apps, could be described in more detail.

With the exception of one teacher who teaches mainly upper secondary, respondents (teachers) would employ the whole material (50 %) or parts (38 %) in their own teaching. Possible connecting points with other areas of the curriculum that are consistently cited are ecology as well as the investigation of specific habitats (e.g. the forest / the forest over the course of a year).

In summary it can be said that teachers perceive the vidubiology material for Module 1 and its whole concept as positive, practical, implementable and activating for pupils. References to possible options for differentiation are connected to a modular system of components. Module 3 in particular considers learners' individual competences and preferences regarding free choice of technology for the investigation and examination of (biological) phenomena. A general assessment of the differentiation possibilities of the vidubiology material can only be made when considering all three modules and how they interact with each other. Expansion of the subject content in the module could focus the perspective on the versatility of the possible applications, however this could also be seen as limiting and determining for lower secondary. Even if the material targets a particular audience, with the given openness of content the transferability to higher years in school should be visible. One possibility for raising the proportion of subject-specific connections in the project presentation could be offering practical examples of lessons undertaken during the vidubiology implementation. This could be via the homepage and through interviews with teachers. The latter was already able to be included and published within the framework of the piloting of the project (YouTube playlist vidubiology). Progressive digitalisation in teaching is essentially accompanied by the rapid changes, developments etc. in technology or rather in technological tools. To do justice to this development in a project with a short time-span is almost impossible. As well as reasons relating to the content and to the project partners, photography and videography were chosen because these technologies are not subject to the rapid changes in the digital world quite as much as other media are. The material was also cited by teachers as being *"relatively timeless, which is a good thing when using in a teaching setting"*. To extend and upgrade the technology is of course possible at several points in the material and concept and to do this remains the task of the teacher who is engaging with and implementing the material.

In summarising the field trial of the vidubiology material a positive conclusion can be drawn: The material for the module fulfils the demands of the responding teachers, both young teachers as well as teachers with more years in the profession and the material will therefore hopefully be implemented in schools and teaching in the future.

LITERATURE

BRÜCKNER, J. (2018). Eine Frage der Qualität. Qualitätsforderungen an Open Educational Resources in Schule und Hochschule. *MedienPädagogik, 32, 51-62*.

NEUMANN, D. (2015). *Bildungsmedien Online. Kostenloses Lehrmaterial aus dem Internet. Marktsichtung und empirische Nutzungsanalyse*. Bad Heilbrunn: Klinkhardt.

NEUMANN, D. (2016). *Open Educational Resources (OER) oder Kostenloses Lehrmaterial aus dem Internet. Marktanalyse 2016 und Aktualisierung der Diskussion*. Verfügbar unter: https://www.pedocs.de/volltexte/2016/12671/pdf/Neumann_2016_OER.pdf (03.11.2019).

REDECKER, C. &PUNIE, Y. (2017).European Framework for the Digital Competence of Educators DigCompEdu.European Union. Verfügbar unter: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/european-framework-digital-competence-educators-digcompedu (03.11.2019).

UNESCO (2019).Guidelines on the development of open educational resources policies.Verfügbar unter: https://www.unesco.de/sites/default/files/2020-01/Guidelines_on_the_Development_of_OER_Policies_2019.pdf (03.11.2019).

Co-funded by the Erasmus+ Programme of the European Union

vidubiology - creative video for biology - VG-IN-BE-17-24-035611

With the support of the Erasmus+ Programme of the European Union. The content reflects only the author's view and the European Agency and the European Commission are not responsible for any use that may be made of the information it contains.

VIDU BIOLOGY

Monique Meier & Armin Hottmann (Eds.)