Evaluation of a wiki for lesson reflection in the project "Kolumbus-Kids" at Bielefeld University

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Abstract

This article deals with a concept helping to reflect on teaching practice in the project "Kolumbus-Kids" at Bielefeld University. Lesson reflection aims at the mediation and training of certain teaching competences of student teachers, and therefore self-reflection is promoted by using the newly developed reflection wiki, its videotaping and reflection tasks.

The theoretical approach behind the reflection wiki harks back to the theory of the *Reflective Practitioner* by D. A. Schön (1983). Further, theories of Dewey (1933, 1951), Zwiebel (2001) and Hager (2008) help to emphasise features of self-reflective thinking and means of their promotion. There will also be an overview of current research in the areas of self-reflection and videography, with the latter being an effective way for improving reflection.

The study presented in this article evaluates the reflection wiki based on data that were gathered in the context of the users' affective-emotional state and assessments made via a questionnaire. All the findings recommend continuing the use of the reflection wiki in the "Kolumbus-Kids" courses.

Key words: video reflection, teacher education, science, Kolumbus.Kids

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Introduction

How does a teacher trainee become a good teacher and which factors are particularly important in this regard? This question served as the idea for creating an online self-reflection concept, a so-called wiki. A literature review stresses the relevance of reflection as being the prerequisite for improving teaching and professionalising teachers' actions (Meyer, 2010; Helsper, 2008; Helmke, 2012; Berner & Isler, 2011; Wegner & Remmert, 2014). Distinct self-reflection abilities are thus the most important skills of a teacher in order to constantly improve one's teaching and by that fulfilling the job's responsibility.

The wiki, which has been programmed just recently, provides the description of proposed actions and teaching skills that can be trained individually throughout one's teaching. In addition to that, supportive questions and tasks for self-reflection on the basis of video sequences make for

effective analysis and meaningful conclusions for later teaching. One of the concept's aims is to improve students' self-reflection competences which are needed in the teacher training following the university studies. Also the *Standing Conference of the Ministers of Education and Cultural Affairs of the Federal States of Germany* (short: KMK, Kultusministerkonferenz, 2004) declares this to be a very important training objective so that teachers can estimate their own abilities and influence their future teaching behaviour. Students in the "Kolumbus-Kids" courses considered the wiki a useful addition to a simply oral debriefing of one's teaching. However, the concept's realisation still has to be evaluated empirically in order to further refine the training concept.

This article's theoretical background is based on the definition of self-reflection as found in D. A. Schön's theory on the *Reflective Practitioner* (1983). With the help of the theories by Dewey (1933, 1952), Zwiebel (2001) and Hager (2008), the features and possibilities of acquiring self-reflective skills will be emphasised. Further, an overview on the current state of research concerning reflection and videography will be provided, which was largely influenced by Krammer and colleagues (Krammer & Reusser, 2005; Krammer & Hugener, 2005), Petko and Reusser and colleagues (Petko, Reusser, Noetzli, Krammer, & Hugener, 2003; Petko & Reusser, 2005; Reusser, 2005), Prenzel and Seidel (Seidel et al., 2005) and Hosenfeld (Hosenfeld & Helmke, 2008; Hosenfeld, 2010). After a short depiction of the wiki, the article focuses on the research procedure. Of special interest are the two research questions "***Which consequence has the use of the reflection wiki on the user's emotional affects?" and "How is the wiki's reflection concept assessed by the users?".*** Both practicability and the success of acquiring teaching skills will be evaluated in this regard. After a description of the results, a discussion and conclusion part will evaluate the wiki's effectiveness.

Theory

The theory section will focus on the topic of self-reflection, and how this extremely important concept can be learned. *(University) students, student teachers* and *teacher trainees* are used synonymously throughout the article, while *pupils* stands for school children. The study has been undertaken in the context of the biology teacher education at Bielefeld University, where student teachers teach in the project "Kolumbus-Kids", an enrichment programme for scientifically talented pupils aged 9 to 13, who come to university in the afternoon and receive additional lessons (for more information see Wegner & Ohlberger, 2014).

What is self-reflection?

The training concept aims particularly at the promotion of self-reflection ability. Some of the most important publications on the topic are by Schön (1983, 1987); with his work *The Reflective Practitioner,* he lay the foundation for many other authors (Meyer, 2010; Berner & Isler, 2011; Petko & Reusser, 2005; Helmke, 2012; Abels, 2011; Hosenfeld & Helmke, 2008; Mehl, 2011). Schön criticises the "Technical Rationality" which puts forward that professionalism is achieved by simply applying theories and methods and rigid problem-solving (Schön, 1983). According to Schön, a professional teacher takes the perspective of a researcher and constantly questions his own actions and attitudes in order to adjust perceptions, methods and objectives to the current context or construct them anew (Abels, 2011). Teachers with that kind of attitude display a constant curiosity in all types of pupil personalities, new developments like the double lesson system and functioning elements such as anchoring phases with the whole class. It is this questioning approach and the willingness to change perspectives instead of tying oneself down to

certain views, methods and learning objectives that is so very crucial in the teaching profession as situations in pedagogical work are extremely variable.

Schön differentiates two reflection levels: the *reflection-on-action* means a retrospective reflection of a completed action at a time where the person does not feel the pressure to act anymore (Schön, 1987). *Reflection-in-action*, on the other hand, takes place during the action (Schön, 1987). The teacher may ask himself after the lesson why pupils did not seem able to transfer technical terms that they acquired with the help of a text on to a new situation (*reflection-on-action*), in order to react to these circumstances in the next lesson. If, for example, the terms 'analogy' and 'homology' were thought to be known in a biology lesson and should then be applied to the context of a mudskipper's anatomy as an analogy to amphibians which then caused problems, a reaction in the next lesson could be the treatment of further examples to practice this type of task. The teacher may also think about reasons already during the lesson (*reflection-in-action*) and act directly, in this case noticing that the terms had not been understood thoroughly, which necessitates explaining the terms again with the help of simple examples.

Based on Schön's theory, there have been many other definitions of self-reflection (e.g. Zwiebel, 2001; Lohmann, 2003; Dorlöchter et al., 2004; Korthagen, 2002; Abels, 2011), however, with an agreement still to be found. Abels therefore recommends setting one's own definition for the particular context (Abels, 2011).

Working with the reflection wiki exclusively affects *reflection-on-action*. This is the reason why Hager's definition can be used in this context:

> Self-reflection focuses on the reflecting person him- or herself – his or her own actions in the past with all its preconditions and consequences are analysed and evaluated when compared with the intended objectives and the degree of fulfilment. The conclusion of this process lays the foundation for the following actions (Hager, 2008).

Using the self-reflection wiki, university students analyse their own conduct of the past lesson. This happens by focusing on different categories in the wiki, such as *lesson organisation*. One particular aim in this category is an expedient conversation technique which enables the inclusion of many pupils and reduces the teacher's talking share. A general requirement is that the student teachers know the conversation's objective and do not lose sight of it during their moderation activity. A successful conversation technique cognitively activates a great number of pupils, whereas a bad conversation results in an unsuccessful mediation of teaching content. The university students can judge the degree of attainment in the wiki with the help of a scale. A consequence of the reflection process could be that doubtful pupil answers are not corrected by the teacher himself but rather passed on to the whole class, which again initiates class discussion.

An aspect neglected by Hager is put in the focus by other authors: reflection mirrors one's own behaviour and leads to the recognition of features and processes that went unnoticed before (Gröning, 2013). Zwiebel and his concept of the *Inner Analyser* assume that every human has the ability to notice unconscious processes, to get involved in them, think about them and consider and update the consequences for one's own actions (Zwiebel, 2001). In the context of the "Kolumbus-Kids" classes, it has become obvious that a typically unconscious behaviour on behalf

of the students is the verbatim repetition of pupils' contributions (*teacher echo*). By confronting the student teachers with this category in the wiki, and by looking at the sample videos when doing the reflection exercises, their attention is drawn to this problem. They suddenly recognise teacher echoes in their own action and reflect on it. The reflection's results (e.g. producing less echoes by only reinforcing and not repeating contributions) will be kept in mind for the next lesson.

There are two further features of self-reflection that are commonly discussed in literature and that should also be included in the definition of the concept as it is used in the wiki. It is agreed upon the fact that reflection is always individual (Hager, 2008) and subjective (Gröning, 2013), since one's own personality determines which kind of information one looks for and how it is processed (Hosenfeld, 2010). One student may find it more important to ask questions very openly, whereas another student considers the questions' linguistic formulation and intonation decisive.

Additionally, reflective thinking is logical, meaning that the train of thoughts should be channelled meaningfully (Dewey, 1951). Dewey, together with Schön, is regarded the originator of the idea of reflection in pedagogical contexts (Abels, 2011) and isolates self-reflection from common thinking. For him, reflective thinking is the most elaborate form of thought which is, unlike the sequence of mental pictures (imagination) and beliefs, not determined by tradition, instruction and imitation (Dewey, 1933). Hager puts it like that: reflection is methodological contemplation, which is why it has to be learned (Hager, 2008). According to Dewey, the method entails (1) the embeddedness of a problem that has to be reflected in a certain context, followed by (2) formulating hypotheses, (3) generating solutions and (4) verifying them practically with the option of repeating this process (Dewey, 1933; this process is very similar to the ALCAT model proposed by Korthagen, for more details see Wegner, Weber, & Ohlberger, 2014). If transferred to an exemplary situation, the process could look like this:

1. There were many classroom disturbances at station 1 of the market place learning.
2. Disruptions were probably caused by boredom as the tasks were too easy for the pupils.
3. Have consolidation exercises ready for stations that can be finished quickly.
4. Arrange another market place learning with new content in one of the following lessons.

Based on the plenitude of theories and definitions that have been presented so far, the following understanding of self-reflection will be taken as a basis for this article:

> *Self-reflection is a subjective and methodological contemplation about one's own past behaviour with its prerequisites and consequences. The intended objectives will be compared with the degree of attainment via internal and external perception in this process and the reflecting person is made aware of one's own abilities and develops ideas for alternatives of action in order to improve one's teaching.*

In the context of reflecting with the wiki (lesson video and reflecting tasks), every student teacher is encouraged to think about his teaching activity in the past lesson individually based on his own perception. His behavioural preconditions, such as the subject-specific knowledge needed for answering pupils' questions, and consequences are examined in that regard. Consequences could be that the pupils learn something the wrong way due to the teacher's lacking knowledge. The teacher should compare his intended aim, for example giving comprehensible explanations, with the degree of attainment, in this case perhaps realising that the explanations were too lengthy

and contained mistakes. The degree of attainment can be evaluated via self-reflection of the video and the external perception, made available through the supervisor and his rating scale. The student will not only be made aware of his abilities and mistakes, but is also encouraged to think of alternative strategies how, for instance, the lacking content could be acquired. This will also raise the issue of preparing better for the next lesson, which would include anticipating potential pupil questions.

How can self-reflection be learned and promoted?

Since reflection is generally seen as the key to constant improvement of one's own teaching (see e.g. Meyer, 2010; Berner & Isler, 2011; Petko & Reusser, 2005; Helmke, 2012; Abels, 2011; Hosenfeld & Helmke, 2008; Mehl, 2011), it is a topic of utmost importance for future teachers and should be promoted by the concept that is to be evaluated in this study. Therefore the question is how learning about self-reflection can be supported most effectively.

Usually, the question remains unsolved, as a look at the KMK Standards reveals (Kultusministerkonferenz, 2004). A potential reason for this is the fact that the development of teachers' professional competences is a rather insufficiently researched field where investigations based on standardised tests were introduced just recently (Blömeke, 2009; Terhart, 2000). Accordingly, only few research results concerning the training of self-reflection can be found (Abels, 2011). Arens sees a general methodological problem since reflective evaluation presupposes the ability to reflect to some degree as a general starting point (Arens Blotzheim, & Koch-Priewe, 2009; also Korthagen, 2002 mentions the problem of measurability). Keeping this in mind, the reflection wiki, too, cannot absolve itself from this dilemma.

Berner mentions that empirical findings state that teachers' reflective abilities are not very distinct (Berner & Isler, 2011). Also other researchers criticise deficits in reflection (Weinert & Schrader, 1986; Hosenfeld, 2010; Clausen, 2002). Helmke, for example, points to the data of TIMSS (*the Trends in International Mathematics and Science Study*) and DESI (*Deutsch-Englisch-Schülerleistungen-International*, translated: German-English Student Performance International), which show that teacher's evaluation of one's teaching does not comply with an external view (Helmke, 2012). These findings are particularly interesting with regard to the rating scales that have to be filled in by the supervisor and the student teacher. However, the amount of misjudgement could not be reviewed in the context of this study. According to Plöger, holding on to routines and levelling alternatives leads to an impoverished reflection ability (Plöger, 2006). This again may be caused by a very high involvement in teaching matters, which makes discussing one's teaching and proposing alternative actions seem like an attack against oneself (Helmke, 2012; Hosenfeld, 2010). For the explanation of this phenomenon, Gröning refers to Foucalt, who compares reflecting one's own behaviour for people growing up in the western-Christian culture as a kind of confession which implies shame and feelings of guilt (Gröning, 2013). For the sake of self-protection, many people attribute successes internally and failures externally. Particularly those people seem very resistant to change and might be the ones who need feedback the most but are the least susceptible to it (Hosenfeld, 2010). These observations can be used to explain differing amounts of performance improvement when working with the reflection wiki. Students who do not attribute failures exclusively to external factors will presumably accept advice and ideas better than students unable to reflect and consequently improve their teaching.

Dewey says that it is precisely this state of uncertainty and doubt that accounts for an essential component of self-reflection (Dewey, 1951). The readiness to doubt oneself and to find approaches to solve a problem are important requirements for self-reflection (Gröning, 2013). Reflection necessitates self-thinking, open-minded people (Gröning, 2013). Further, according to Dewey, people should be outgoing (being curious, considering other perspectives, understanding facts), serious (undivided attention) and responsible (Dewey, 1933). Abels adds the ability to analyse situations from various perspectives (Abels, 2011), which with respect to the wiki means analysing different categories such as *media usage* or *body language*. These assumptions mirror Zwiebel's theory stating that practically everyone possesses reflection abilities, but certainly in different manifestations, depending on genetic disposition and socialisation (Zwiebel, 2001; Korthagen, 2002also shares this view).

Among others, Zwiebel assumes that, due to the preconditions brought along, self-reflection abilities can be learned and promoted (Zwiebel, 2001; Abels, 2011). This also suggests the commonly shared perspective that people can be situated at different developmental stages of their reflection competence (Abels, 2011). A possibility to support the development in a higher stage of reflection has come to be seen in videography. The USA and some Swiss cantons hold the leading role in making videography the tool for professionalization, but it also gains importance for teacher development and reflection in Germany (Helmke, 2012). Videography is said to help improve one's self-reflection ability (Krammer & Reusser, 2005; Mehl, 2011), which is why the wiki concept also uses it.

As Dewey already emphasised by uncertainty and doubt being part of self-reflection, it becomes clear that reflection has a strong emotional component (Schülein, 1998, p. 9f.: self-reflection is not comparable to object reflection since one's own identity is worked on. Emotions may contort self- and external interpretation). Above all, the feedback's or reflection's influence on affects like *enthusiasm*, *joyful commitment* and *activity* should be considered since they influence human behaviour and cognitive abilities in an inhibitory or reinforcing way (Hosenfeld, 2010). Thus, a climate of confidence and protection is necessary (Gröning, 2013), which particularly applies to the supervisor who is responsible for creating a pleasant atmosphere during joint reflection. If negative affects are to be mentioned, it is probable that reactions like adjustment of one's own demands or ignorance and shunning are evoked instead of a meaningful behavioural change to overcome the discrepancy of intended aim and actions (Kluger & DeNisi, 1996).

Feedback on the conversation technique, such as the teacher taking up too high an amount of speech and by that pre-empting findings, might not lead to a reflection and an attempt for improvement but instead to an extenuation and reduction of standards (e.g. time was running out; I was happy having reached the conversation goal; it was ok). In the worst case, the student teacher does not accept the feedback at all and avoids future feedback without changing his conversational behaviour. In order to diminish personal involvement and emotions which could stand in the way of proper reflection, videotaping one's teaching is a good method. Since there is a certain distance of time (the video is viewed back at home after teaching) and a clear-cut observer role, one's own emotional involvement can be put into perspective and one's memories can be compared to a partially objective external view (Hosenfeld, 2010). By doing so, the distance to one's actions necessary for self-reflective learning can be established.

For the development of reflection competence, it is further recommendable to offer as many reflection stimuli as possible, which, in practice, means confusing situations or problems that induce reflection (Berner & Isler, 2011; Helmke, 2012; Dewey, 1951). Experiences with videography for research purposes have shown that ingrained behaviour also occurs when the lesson is being taped and the camera will soon be forgotten after a few moments of excitement (Hosenfeld, 2010). The reflection wiki picks up on that idea by giving the students a few suggestions of reflecting their teaching behaviour in a conversation with fellow students and the supervisor, before they intensively reflect on their video. The concept's evaluation aims at assessing whether the assumed advantages of videography with regard to the reflection wiki (teaching, joint reflection, processing reflection tasks in the wiki with the help of the video) come true and whether students consider the wiki useful regarding their self-reflection competence.

Current state of research

Using videos for reflecting one's own teaching seems promising in order to improve teaching and reflection abilities. The concept to be evaluated is also largely based on video reflection. In the following, the current state of research concerning videography in teacher training is outlined, with the two focuses being performance increase via videography and self-reflection as such.

Research results concerning emotional effects and performance increase with the help of lesson videos

In general, there is little empirical evidence for using videography (Hosenfeld & Helmke, 2008; Hosenfeld, 2010; Krammer & Reusser, 2005) and particularly web-based learning with lesson videos (Krammer & Hugener, 2005). According to Krammer, recent findings in this area point towards predominantly positive effects of web-based use of videos on teachers' and students' knowledge and emotional condition (Krammer & Hugener, 2005). Working with lesson videos, similar to working with the reflection wiki, was examined in the context of Sharpe, Hu and Crawfords' study (2003). Demonstrative lesson videos, which are used in the wiki for educational purposes, have been found to affect teachers positively as Anglophone studies suggest (Hsu, 2004, Schrader, Leu, & Kinzer, 2003, Steinkuehler, Derry, & Woods, 2002, Yang & Liu, 2004, as cited in Krammer & Hugener, 2005, p. 54). Krammer could further confirm this statement in his own explorative case study (Petko et al., 2003) since the result hints at the efficacy and acceptance of web-based learning with videos. Students attained a measurable performance increase and assessed satisfaction, motivation and the specific benefits of the learning platform as very positive (Krammer & Hugener, 2005). Referring to the positive effects on the user's performance, Hattie and Timperley's meta-analysis on video and audio feedback states a mean effect size of .64 for the performance increase as a dependent variable (Hattie & Timperley, 2007) and therefore supports Krammer's assertion. Hosenfeld comments critically that it is hard to prove whether the usage of videos also brings about comparable effects in advanced teacher education (Hosenfeld, 2010). Evidence for that is featured by Seidel and Prenzel's study which could show that teachers' competences can be trained with the help of videos since learning-effective criteria can be perceived and classified much better (Seidel & Prenzel, 2008). In the context of the reflection wiki, student teachers are encouraged to analyse their teaching behaviour from different viewpoints. Researching video clubs in the USA, Sherin and van Es analysed teaching scenes together with a maths teacher every month and found that selective perception changes from teacher to pupil actions, from the general to the specific and from describing to interpreting. The authors concluded

that videos help to train one's analysing abilities (Sherin, 2009). Evaluating Wackermann, Trendel and Fischer's advanced training for physics teachers, who were to implement basic models of teaching and learning and had to videotape their lessons, effects on the level of teacher beliefs, teaching actions and pupil perceptions could be obtained (Wackermann, Trendel, & Fischer, 2008). These positive findings suggest the assumption that changes on a cognitive level can also be achieved by using the reflection wiki.

Further research regarding empirical findings on the effectiveness of dealing with video tapings is needed (Reusser, 2005). A study about the evaluation of online advanced training courses for mathematics teachers found that teachers who consider their learning success as high, also apply the newly acquired approaches in their lessons. The more extensive the trial in their own lessons was and the higher they considered their learning success, the more they preferred to integrate the contents of the training course into their teaching further on (Szymanski & Bruder, 2012). These results are particularly important since an integral part of the concept presented here is that the teaching abilities as described in the wiki are to be tried and tested in practice as intensely as possible so that the learning success can be reflected on.

Prenzel and Seidel conducted several experimental studies in the project LUV (*Lernen aus Unterrichtsvideos,* translated: learning from teaching videos) and detected that the subjective learning success of employed teachers working with the project's software is higher when they watch a video of their own lesson, when they are experienced in dealing with videos and when watching the video is linked to a structured task (Seidel et al., 2005, as cited in Hosenfeld, 2010, p. 31).

Likewise, the university students in the "Kolumbus-Kids" courses reflect exclusively on their own videos and do so guided by structured and didactically justified tasks. If they, however, already have had experiences with video reflection could not be exactly determined. Still, huge differences in quality and quantity of previous practical experiences on part of the students could be observed, which might influence the subjective learning success.

Studies by Krammer and Reusser, Krammer and Hugener, and Gärtner show that thorough planning and organisation of video learning is very important to consider and that the video needs to be embedded into an advanced training concept with suitable questions, working and learning tasks (Krammer & Reusser, 2005; Krammer & Hugener, 2005; Gärtner, 2007).

Krammer and Hugener conducted a study with 54 student teachers in 1999, who were to discuss questions on teaching quality and preparation on the basis of watching foreign lesson videos (Krammer & Hugener, 2005,). Their data were gathered with the help of an online questionnaire with open and closed questions for the subjective assessment of the method’s usefulness and effective conditions. The results could show that stimulating learning contents and suitable videos had an influence on the test persons’ perceived learning success (see figure 1). The learning success again influenced the training’s usefulness as perceived by the test persons, which also depended on whether the advanced training course’s organisation was perceived as meaningful. Technical difficulties had a negative effect on the usefulness, but not on the assumption of having learned something (Krammer & Hugener, 2005). The reflection wiki presented in this article also relies on online data issued from closed and open questions about the usefulness of the wiki, however, based on reflecting one’s own teaching videos. It can still be assumed that the effective conditions are similar in both settings. Krammer and Hugener derive six conditions for web-based learning with lesson videos (see table 1).

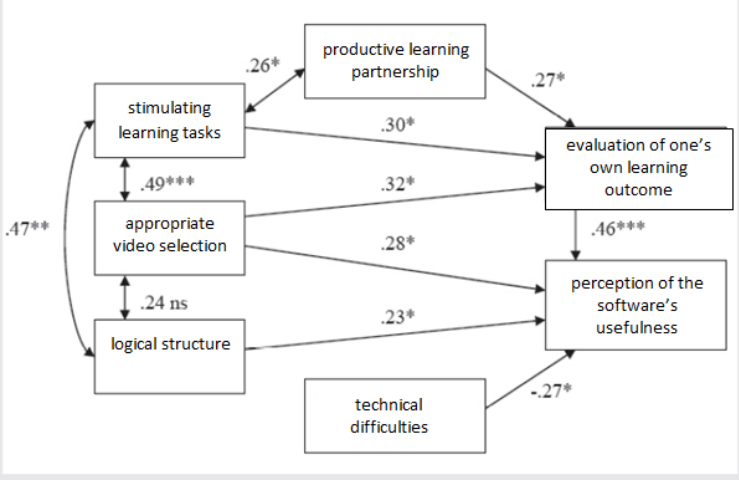


Figure 1: Conditions for a positive evaluation of the learning success and usefulness of the LessonLab software in the study by Krammer and Hugener (2005, p. 57).

Table 1: Conditions for successful web-based learning according to Krammer and Hugener (2005, p. 80), with reference to the reflection wiki.

Condition	Application in the reflection concept
Working technology	Existing. Functioning was ensured through multiple test runs beforehand. In case any errors occur, contact persons are available to amend faults.
Good introduction to operating principles	An introduction is implemented in a small group meeting prior to the first course day. The university students can ask questions and are required to work on the introductory tasks in the wiki within the following week so that they themselves experience the wiki’s handling.
Thoroughly constructed tasks that are embedded into content	The tasks are carefully selected and didactically justified and thus go along with the concept (see Wegner & Remmert 2014). Among other aspects, also the tasks will be evaluated in this study.
Support	The contact persons for questions regarding the wiki are always approachable personally or via email.
Discussions with the whole class	In the debriefing with a supervisor and fellow students, the reflecting student gains first reflection impulses.

Sufficient time allowance	Students can work self-paced and have at least a week to complete their reflection tasks.

According to these results, research agrees that video reflection always requires an intelligent learning environment and a thorough didactic preparation, since simply watching videos will not help trigger the learning processes wished for (Hosenfeld, 2010; Mehl, 2011; Krammer & Reusser, 2005; Reusser, 2005).

Regarding data collection for the subjective perception of one's learning success, it has to be noticed that it cannot be put on a level with the actual competence gain as the students' impressions are sometimes based on delusion (Mehl, 2011). Due to this study's scope, the actual competence gain cannot be measured, however, the aspect should be considered when interpreting the results.

Some researchers also question whether the actually acquired competences are permanently transferable to the teaching profession (Boelhauve, 2009; Beck & Stelmaszyk, 2004). Mayr, on the other hand, states that competences acquired in teacher training and in practice-oriented teaching-learning-adaptations can successfully be applied in the future (Mayr, 2003, as cited in Blömeke, 2009, p. 486). Since the reflection wiki features a strong practical relevance due to its connection to the "Kolumbus-Kids" courses, one can assume that the mediated contents and competences can be used in the future. Another interesting finding regarding the subjective assessment of learning success comes from an evaluation of the theory-practice-module at TU Dortmund University. In the evaluation's context, a longitudinal study with three points of measurement was conducted and with the help of questionnaires for the students, their subjective knowledge increase (e.g. in reflecting differences of theory and practice more effectively and planning, trying and reflecting their teaching better) was assessed. It became apparent that the competence acquisition is not linear, but that the perception is very high in the beginning, low in the middle and the highest at the end (Arens et al., 2009).

Research results concerning self-reflection with the help of lesson videos

Korthagen notices that there are only very few investigations based on programmes that promote self-reflection competence (Korthagen & Wubbels, 2002). In general, four studies can be found dealing with the facilitation of reflective abilities.

Von Felten developed and evaluated a concept concerning a reflective practical (material-supported reflection of teaching experiences) on the basis of interview data, and found that the reflective practical with its instructed reflections promoted the reflection ability and the development of actions more successfully than common practicals (von Felten, 2005).
Kilgore and colleagues found in their case study that supporting instructions from a supervisor, exchange with colleagues and the freedom to try out individual ideas and teaching strategies positively influence the reflection competence of teachers (Kilgore, Ross, & Zbikowski, 1990).

The instructed reflection and support mentioned in the two studies was implemented in the concept of the reflection wiki by having carefully structured reflection tasks and the joint reflection after every lesson, which is led by the supervisor. The joint reflection also provides the chance for exchange amongst colleagues. The students thus experience freedom in coming up with solution

strategies for problematic teaching situations (e.g. disruptions) which can then be tried in the following lesson.

Van Eekelen and colleagues conducted a qualitative study about teachers' willingness to learn in connection with the readiness to reflect and found that the willingness indeed influences self-reflection. It can be assumed that particularly those teachers that belong to the type "eager to learn" (as opposed to "not seeing why there is a need to learn" or "wondering how to learn") can benefit from self-reflection. The willingness to learn is again influenced by the social environment and the presence of feedback and appreciation (van Eekelen, Vermunt, & Boshuizen, 2006). Also in the context of the presented reflection concept, it can be expected that the students' willingness to learn has a huge influence on their learning success. Due to that reason, the reflection wiki tries to appeal to the willingness to reflect right in the introductory part. Further, the supervisors are anxious to construct a positive social environment within the course and to provide the students with constructive feedback in order to positively influence their willingness to learn.

Korthagen and Wubbels also noted that student teachers participating in their study differed in their attitude towards reflective learning. *Internally oriented* student teachers wanted to use reflection processes to structure their experiences on their own, while *externally oriented* student teachers asked for structures from the outside. Particularly the interviews showed that *internally oriented* teachers profited more from the programme for promoting reflection (Korthagen & Wubbels, 2002). These results corroborate Zwiebel's belief that self-reflection is also partly conditioned by predisposition (Zwiebel, 2001). Experiences from the "Kolumbus-Kids" project have shown that some students are more open towards reflection than others, which might be explained by an *internal* or *external* orientation. It can be presumed that the orientation does not only influence the benefit it has for the students, but also their evaluative judgment.

Another four studies dealing with the reflection ability connected to videography will be looked at in the following. Hosenfeld linked a VERA (Vergleichsarbeiten, *translated: comparison tests in primary schools*, University of Landau) examination with a video study (N = 65 primary school teachers) and found that using video-based teaching feedback depends on the willingness to cooperate and knowledge of one's own teaching style (Hosenfeld & Helmke, 2008). There are many students in the "Kolumbus-Kids" courses who differ in their willingness to cooperate (e.g. some prepare their lesson categorically on their own while others take the initiative and discuss things like group arrangements together or even develop consecutive lessons together) and in their familiarity with their own teaching style, which becomes particularly apparent in the joint conversation.

Hosenfeld concludes: Teachers who cooperate (meaning preparing lessons together, exchanging materials etc.) seem to benefit from videotaping their own lessons ($r = .31$). Teachers, however, who already have a clear image of their own teaching, do not seem to have any more reason to reflect or change something about their actions when watching a video of their lesson (Hosenfeld & Helmke, 2008).

Reviews show that the latter attitude is not necessarily justified as those teachers' competences and their pupils' learning success was not significantly higher than of other teachers. There is a significant correlation between knowing one's teaching style and job satisfaction ($r = .26$), and particularly these teachers who are familiar with their teaching style and are satisfied

with it, have little need to cooperate (r = .22) and reflect (Hosenfeld & Helmke, 2008). Student teachers with an attitude like that are presumably more difficult to approach with the reflection concept. They can thus benefit only little and will tend to evaluate the concept less positive than students who extract useful impulses from videography.

Regarding the willingness to cooperate, findings reveal that it correlates with the willingness to innovate (Gräsel, Fußnagel, & Pröbstel, 2006) and is therefore indicative of a kind of openness which is also demanded as a prerequisite for self-reflection ability by Dewey (Dewey, 1933).

The videography's advantage is perceived subjectively by every person and thus influenced by the person's willingness to cooperate and her knowledge of her own teaching. The subjective perception again has effects on the extent to which the video is adopted, the extent of reflection and the purpose to change something about one's teaching (see figure 2). The following statistical correlation could be found: Someone who considers watching the video beneficial, also thinks more about one's teaching (r = .43). Eventually, the extent of reflection (how hard did someone think about the lesson) correlates highly positive with the intention to change different aspects of teaching (r = .53) (Hosenfeld & Helmke, 2008).

The willingness to self-reflect is further influenced by a high perceived self-efficacy (Hosenfeld & Helmke, 2008). It can be assumed that this causal network (see figure 2) also applies to this evaluation's reflection concept.

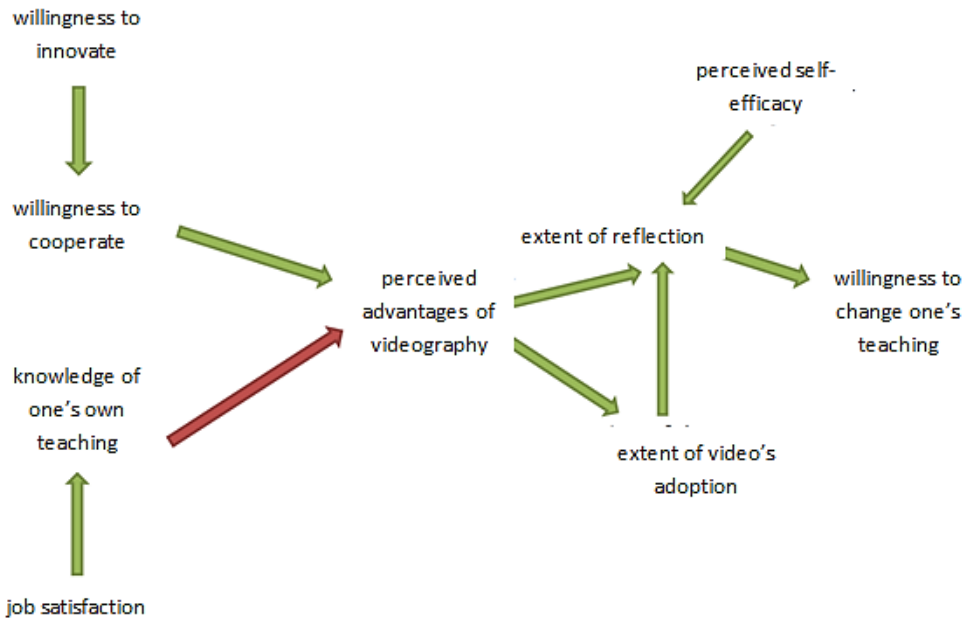


Figure 2: Influence on the perceived benefits of lesson videos and influence through the perceived benefits. The green arrows show a positive influence, whereas red arrows illustrate a negative effect. (Data from Hosenfeld & Helmke, 2008, p. 53f.).

Mehl designed a tool for the video analysis of school-practical studies (sports-edu) in order to facilitate self-reflection and afterwards used qualitative interviews to evaluate the effect as

described by students (Mehl, 2011). Overall, the learning platform was assessed positively as teaching processes could be analysed. Further, the blended-learning design suited the students' operating principles. A frequently mentioned effect was the extension of self-reflection by analysing one's videos and transcripts. The perception of one's actions is seen as the trigger for further reflection and thoughts about alternatives in planning and conduction. Another effect is the widening of the teaching perspective and potential action alternatives. Barely mentioned, however, was the effect of interlocking theory and practice as well as the development of jargon (Mehl, 2011).

Ratzka, Lipowsky, Krammer and Pauli evaluated a German-Swiss advanced training concept with online and presence phases in which teachers (N = 24) could widen their teaching perceptions with videos, reflection and observation tasks. The high amount of work was considered a problem as well as handling the technology, since the frustration tolerance for working with a PC had been classed too low. Still, the test persons in this setting remarked positively that new mindsets about one's teaching were developed (Ratzka, Krammer, & Lipowsky, 2005). These results on online learning offer new indications which might influence the evaluation of this study's online reflection concept, as the question on the amount of work will also be raised.
An elaborate study from Gärtner (control group pre-post design, N = 14 for intervention; N = 8 for control, time span one year) dealt with teachers and their engagement with videos and reflection thereof. It could be observed that the visual feedback of a lesson's unconscious actions made teachers aware of their behaviour and by that provided the chance to change something about it (Gärtner, 2007). Changes in the teaching and mindsets of teachers were the result; however, these did not affect the pupils (Gärtner, 2007). Further, the fun, joy and heightened motivation that the participants experienced during the training course encouraged them to try out something new (Gärtner, 2007).

The small number of research results on self-reflection with videos and competence gain through videography confirm that there is still a vital need for research in this field. According to Mehl, existing evaluations most commonly focus on advanced training for already qualified teachers, which is why a new focus should be laid on the deployment and effects of web-based video-reflection in the early phase of teacher training (Mehl, 2011). This is exactly where the evaluation at hand begins. The study makes a contribution towards answering the question to what extent self-reflection and teaching competences can be promoted through video-reflection in the special case of early teacher education at XXX University. If you want more information on the wiki's concept and all its details, go to the project's homepage (www.kolumbus-kids.de), the reflection wiki (in German, http://lul.uni-bielefeld.de/projekte/masterarbeit/) or have a look at Wegner, Remmert and Strehlke (2014).

Research questions and hypotheses

The evaluation intends to examine the users' subjective perception of the reflection wiki in order to make a point about the wiki's effectiveness. There are two focus areas to consider. First, the wiki's effect regarding the user's emotions should be looked at. Since positive emotions support interest development (Krapp, 2010) and learning (Hascher, 2005; Schieferle & Schaffner, 2010), it is obvious that they are crucial for substantial self-reflection. In case the concept leads to positive affects, it can be assumed that this again results in positive effects for self-reflection. Further, the connection with positive emotions will supposedly entail a positive attitude to self-

reflection in the future, which is why the first research question is: ***Which consequence has the use of the reflection wiki on the user's emotional affects?***

Apart from positive feelings, also *aversion* and *boredom* are likely to occur. First oral feedback however suggested that positive reactions prevail, which ties in with findings from Krammer and Hugener and Gärtner (Krammer & Hugener, 2005; Gärtner, 2007). Three hypotheses were investigated in this regard, from which only one will be discussed in this article (see table 2).

Table 2: Hypotheses tested in the study, grouped according to the research questions.

Research Question 1: Which consequence has the use of the reflection wiki on the user's emotional affects?	
H I	After having used the wiki, the users' positive affects outweigh the negative affects.
Research Question 2: How is the wiki's reflection concept assessed by the users?	
H II	The wiki helps to improve self-reflection.
H III	The wiki helps to improve teaching skills.
H IV	The wiki is well-accepted by the users.
H V	The wiki is designed in a user-friendly way.
H VI	The wiki encourages an intense examination of one's own teaching video.
H VII	The wiki encourages an intense examination of one's teaching skills.
H VIII	The student teachers assess the "Kolumbus-Kids" course positively.

The second research focus regards the cognitive area and in particular how the users assess the wiki: ***How is the wiki's reflection concept assessed by the users?***

The assessment aims at different areas which are regarded decisive aspects for the wiki's quality. The two most important aspects for the wiki's quality analysis are based on the fulfilment of the previously set concept aim, namely evoking a bilateral knowledge gain in the user. Primarily, an intense involvement with one's previous lessons and the self-reflection connected to that is sought. The second aim is training one's teaching abilities which provide young and inexperienced teachers with a certain degree of structure and security. The benefits of web-based learning with the help of videos for the promotion of self-reflection abilities have already been proven by Mehl (2011), Krammer and Reusser (2005), Krammer and Hugener (2005) and Wackermann and colleagues (2008). Therefore, the knowledge gain regarding reflection ability and teaching competences are focalised in hypotheses II and III (see table 2).

Further aspects that add to the wiki's quality are conditions for the users' learning success at the same time. An inherent prerequisite for a beneficial use of the wiki is a positive attitude towards the reflection concept, as put forward by studies of Korthagen and Wubbels (2002) and Hosenfeld and Helmke (2008). It is important to evoke high acceptance on the part of the user so that a joyful engagement is ensured, which in turn is necessary for the development of intrinsic motivation and interest (Hascher, 2005; Schieferle & Schaffner, 2010; Krapp, 2010) to further work on one's teaching abilities and to become a *Reflective Practitioner* (Schön, 1983). Krapp states: It holds that for the development of interest a person can only engage with a certain subject area permanently and with inner affinity, if it is regarded as sufficiently meaningful and if a

generally positive emotional quality of experience arises throughout occupation with the subject (Krapp, 2010, p. 316). Due to that hypothesis IV was formulated (see table 2).

The hypothesis will be tested with the help of items that question whether users considered working with the wiki as good and meaningful, and thus regard it as sufficiently significant to themselves on the basis of rational thought (Krapp, 2010). The second requirement for interest development according to Krapp for a generally positive emotional quality of experience (Krapp, 2010) is examined by the first hypothesis which is tested with the help of PANAS (*Positive and Negative Affect Schedule*).

According to Mayer, the e-learning tool’s design and feasible structure enables an easy and structured reflection and is thus decisive for the user’s learning success. He cites the principle of individual differences which says that learners with previous knowledge can better compensate a lack of structure and guidance in a multimedia presentation than learners without previous knowledge. The design therefore has a stronger effect on learners without previous knowledge, which is the case for most wiki users, and should provide enough instruction and orientation (Mayer, 2001). The importance of the design for the overall quality of the wiki was considered in hypothesis V (see table 2).

The hypothesis bears relation to the research results of Seidel et al. (2005, as cited in Hosenfeld, 2010, p. 31) and Krammer and Hugener (2005) which showed that well-structured and appealing tasks as well as a meaningful structure and video selection improve the learning success.

In his supply-demand model, Lipowsky states that a decisive aspect for learning success is whether the learner makes use of the offer (Lipowsky, 2006). Is this the case, the wiki’s quality of supporting reflection abilities and mediating teaching competences can only become apparent if the respective wiki user uses the reflection wiki as intensively as possible. These considerations refer to the studies by Hosenfeld and Helmke (2008) and Symnaski and Bruder (2012) which showed that the engagement’s intensity with reflection support the intention of working on one’s own teaching in the future. Therefore, hypotheses VI and VII have been formulated (see table 2).

Ultimately, underlying circumstances in which the reflection wiki will be used also have an impact on the learning success and the wiki’s evaluation (Krammer & Hugener, 2005). If a student teacher is unsatisfied or over-challenged by the course content, the supervisor or the lesson plan, it seems natural that this finds expression in working with the wiki, as put forward in hypothesis VIII (see table 2).

Figure 3 provides an overview of the aspects discussed previously that are considered relevant for the wiki's evaluation as well as corresponding research questions, hypotheses and survey instrument.

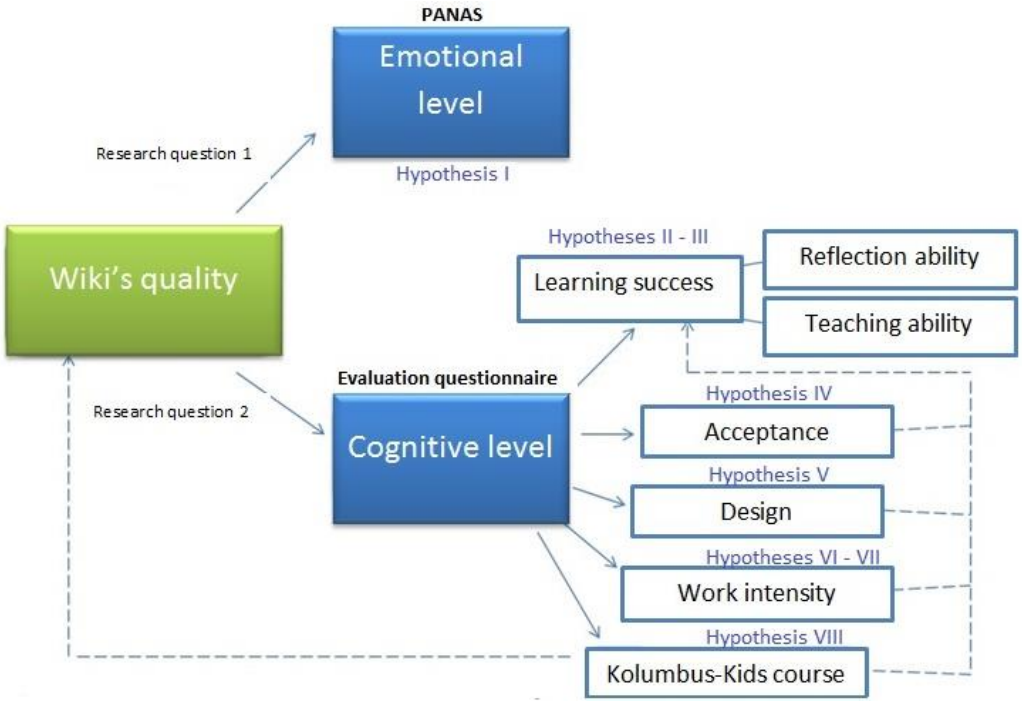


Figure 3: Overview of the research questions and hypotheses. The categorisation of relevant aspects for evaluation is indicated by blue arrows. The influence of the aspects among themselves is illustrated by dashed arrows.

Sample and course of the study

The study at hand extended over a period of roughly 14 months (Feb 2013 – Apr 2014) and was conducted in the "Kolumbus-Kids" courses at XXX University. Altogether, 45 student teachers of the biology department participated. 25 of them filled in the PANAS questionnaire as well as the evaluation sheet and could therefore be included in the analysis of results (10 male and 15 female students).

Figure 4 provides an overview of the research design. Due to the point of time of surveying, the reachability of participants and the reduction of working steps, data were surveyed with the help of online questionnaires hyperlinked in the wiki. At the beginning of the study and after the completion of the third video reflection, a PANAS questionnaire was used. The second point of measurement also saw the deployment of an evaluation sheet for the wiki.

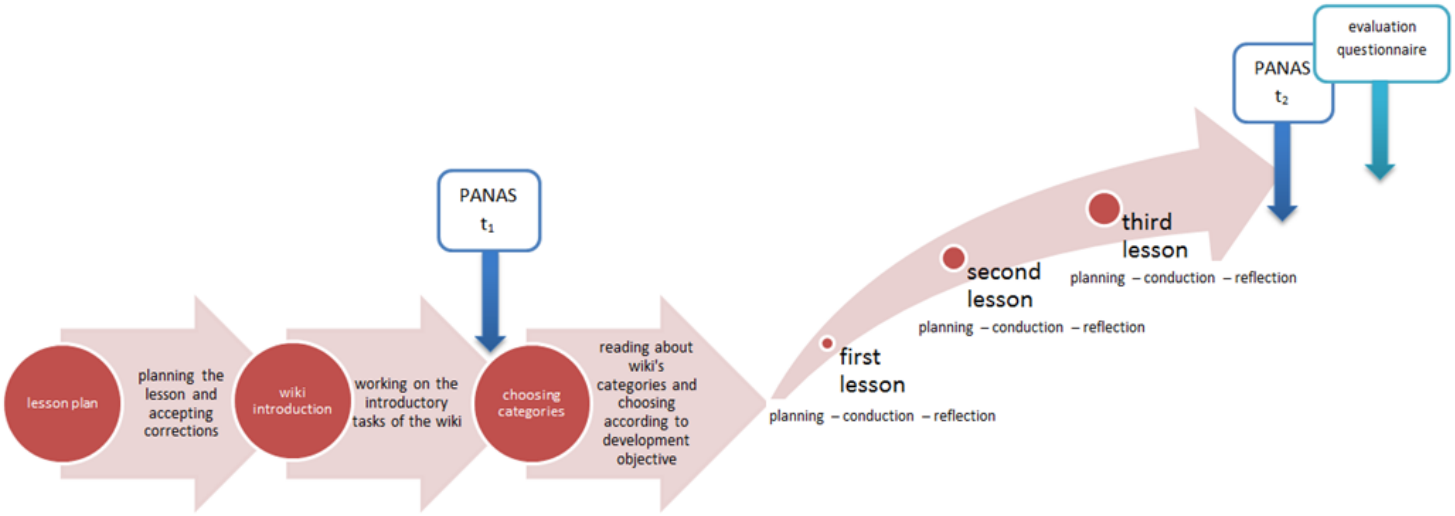


Figure 4: Course of the study. The points of measurement for the PANAS as well as the evaluation questionnaire are indicated by blue arrows.

Conception of the PANAS questionnaire

PANAS is a rather global procedure to measure affectivity (Krohne, Egloff, Kohlmann, & Tausch, 1996) and serves the evaluation of hypothesis I. The PANAS questionnaire used in this study is based on the *Positive and Negative Affect Schedule* (Krohne et al., 1996). This instrument draws upon an emotion model which reduces the number of self- and externally observed affects to two dimensions that vary independently from each other: positive and negative affect (Krohne et al., 1996). The positive affects’ (PA) dimension describes the degree of enthusiasm, activity and attention of a person, while the negative affect (NA) gives the degree of negative tension (see table 3).

Table 3: Characteristics of PA and NA (according to Krohne et al., 1996, p. 140).

Positive affect		Negative affect	
High score	**Low score**	**High score**	**Low score**
Energy	Lethargy	Tenseness	Silence
Concentration	Sadness	Nervousness	Calmness
Joyful commitment		Fear	

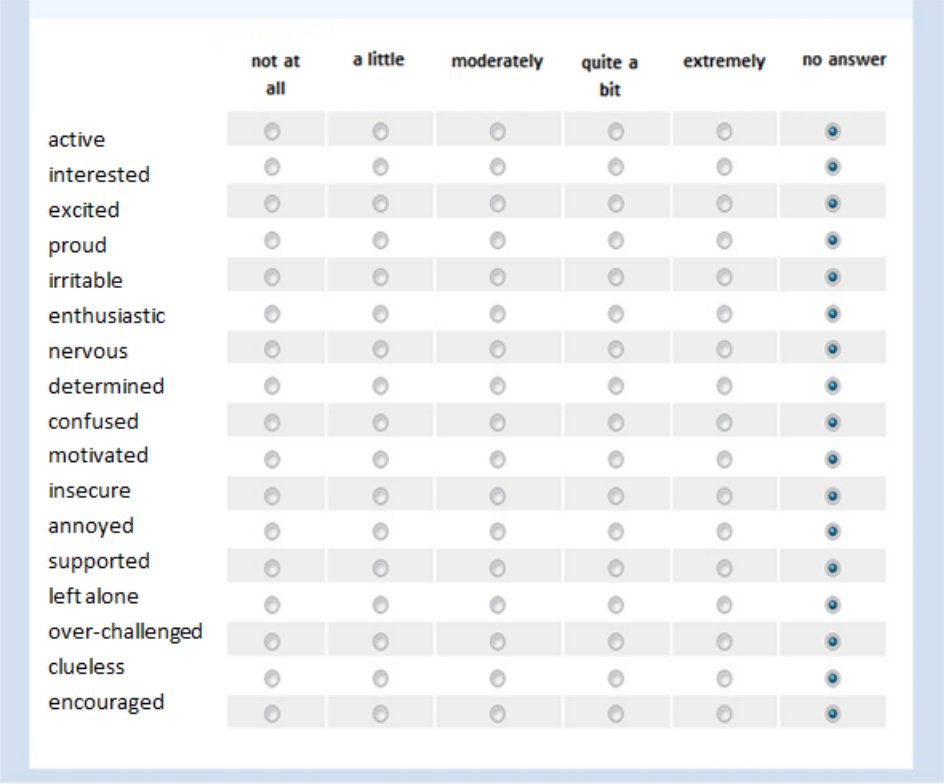
PANAS is suitable for the study at hand since it is a short, reliable measurement method which enables an economic compilation of PA and NA. Both dimensions vary independently from each other and inherit different validities. All in all, it is a well-established instrument (Krohne et al., 1996). Originally, PANAS is a self-description instrument consisting of 20 adjectives with ten of them each being positive (e.g. active, enthusiastic) and negative emotions (e.g. nervous, confused) (Krohne et al., 1996). In the context of this study, some adjectives were left out or slightly changed in order to adapt the instrument to the setting. Eventually, the questionnaire

consisted of nine positive and eight negative items. Table 4 shows the complete set of items compared to the original version.

Table 4: Comparison of the original PANAS item set and the PANAS item set used for this evaluation. Items in black were left as they are, items in red were replaced or dropped and items in green were added.

Positive	*Negative*
active	~~distressed~~
interested	~~upset~~ → *annoyed*
excited	~~guilty~~
~~strong~~	~~jittery~~
enthusiastic	~~hostile~~
~~alert~~	irritable
determined	~~ashamed~~
~~attentive~~	nervous
proud	confused
motivated	~~scared~~ → *insecure*
supported	*left alone*
encouraged	*over-challenged*
	clueless

The test persons have to assess an affect's intensity on a five-point scale, with the stages being [1] not at all – [2] a little – [3] moderately – [4] quite a bit – [5] extremely ("PANAS", n.d.). The first stage actually included "very slightly" as well. Providing the participants with the



possibility of not answering an item, the scale-independent choice "no answer" was added to the questionnaire (see figure 5).

Figure 5: The PANAS items and scaling adapted to this evaluation's setting.

There are six different instructions referring to specifications of different time spans: How do you feel at the moment – How did you feel today – How did you feel in the past few days – How did you feel in the past few weeks – How did you feel in the last year – How do you feel in general (Krohne et al., 1996). The instructions aim at measuring temporarily limited (instruction 1 – 5) and habitual (instruction 6) affectivity (Krohne et al., 1996). Since the focus of this evaluation is the subject itself, namely self-reflection with the help of the wiki rather than the time interval, the instructions were as follows:

> "This questionnaire contains a number of words that describe different feelings and emotions. Next to the scale, please indicate the intensity of that feeling when thinking of your self-reflection. You can choose one of five stages."

Further, the self-describing affectivity is presumably influenced by the current mood (Krohne et al., 1996). This, however, is not regarded a specific problem of PANAS, but can also be found in self-description of other affective variables (Krohne et al., 1996, p. 152, also see Schwarz, 1988, p. 157 as an example).

Conception of the evaluation questionnaire

In order to test hypotheses II – V, a self-designed questionnaire was used. Apart from the PANAS, targeted information about the assessment of the wiki's aspects and effects was to obtain. The instruction for the questionnaire was: "In order to further improve the reflection concept, we need your opinion. In the following, you see several statements. Tick whether you agree or disagree with the statements."

The evaluation questionnaire is divided into three parts. First, there are evaluative statements about the wiki's concept, which can be either agreed (yes) or disagreed (no) to on a binary scale. In the second part, the course participants are asked to give positive and negative remarks about using the wiki in the form of an open answer. The third part then asks about the amount of time needed for the tasks in the wiki so that the effort can be estimated.

As for every empirical study, the three main quality criteria have to be fulfilled. A very short depiction of the quality criteria and their degree of realisation is provided in table 5.

Table 5: Overview of main quality criteria, their definitions and their realisation in this study. Text in green shows a successful realisation of the criterion, while red text reveals possibilities of improvement.

Quality criterion	Definition	Realisation
Implementation objectivity	Result will be the same irrespective of the test conductor	Due to the system of an online survey, contact to the test conductor is completely ruled out. The environment, in which the participant fills in the questionnaire, is an uncontrolled confounder.
Evaluation objectivity	Result will be the same irrespective of the test evaluator	The test provides answering possibilities on a scale that are unambiguous. Open answers are not interpreted in a detailed manner, but are simply used for substantiation examples for positive and negative assessments.
Interpretation objectivity	Different test conductors reach the same results for test persons with the same test value and interpretations.	The classification of answers along a scale limits the test conductor in his room for interpretation. Results of a norm sample do not exist.
Reliability	Degree of accuracy that is used for measuring a criterion in a test without any measurement errors.	Reliability has been proven with Cronbach's α.
Validity	Degree of accuracy that is used for measuring exactly that criterion which the test intends to measure.	Most of the PANAS items are from an externally ascertained source. The evaluation questionnaire has not been tested for validity. In order to reach a high measurement accuracy, an item set formulated as precisely and complete as possible was created, which depicts the criterion as representative as possible.

Results

PANAS results

The results for the positive and negative affects according to the PANAS questionnaire have been calculated on the basis of mean values. Therefore, the intensity "very slightly or not at all" was assigned a 1, "a little" a 2, "moderately" a 3, "quite a bit" a 4 and "extremely" a 5. Before working with the wiki (point of measurement t_1), 45 university students completed the PANAS questionnaire. After having worked with the wiki, 24 students took part in the PANAS survey. Since comparing the mean values should allow drawing conclusions about the wiki's effects on

emotional affects, the mean values were only calculated with the data of those users who filled in the questionnaire at both points of measurement.

For a general overview, the mean values for both measurements are plotted against the individual items. Figure 6 displays only PA items, whereas figure 10 shows the NA items. It holds true for both diagrams that only the reliable items were used for the analysis in order to make reliable statements about the constructs. The diagrams' comparability is ensured by a scale on the y-axis stating the items' intensity from 0 to 5, and a scale on the x-axis taking item values from 1 to 5.

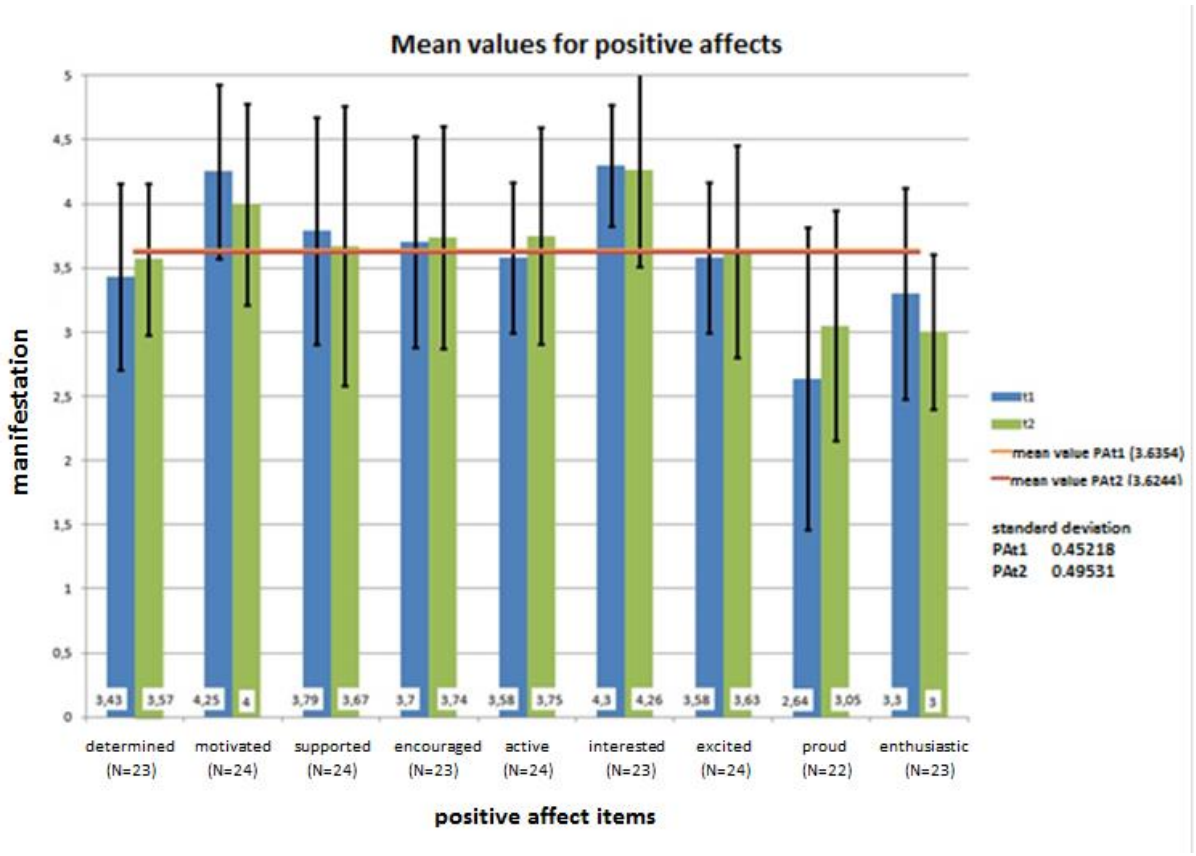


Figure 6: Mean values of reliable PA items. The x-axis shows the PA items and the y-axis their manifestation on a scale of 0 to 5. The bars display the items' values with their standard deviation at t_1 and t_2. The red and orange lines depict the PA mean value at both times of measurement.

Apart from the items *proud* (t_1 and t_2) and *enthusiastic* (t_2), all the items score distinctly more than 3. The mean for all positive affects is $\bar{x}$=3.6354 for t_1 and only slightly lower for t_2 with $\bar{x}$=3.624. A high manifestation for PA implies positive emotions which could be proven both before and after using the wiki. A paired t-test for PAt_1 and PAt_2 ($p = 0.916 > 0.05$) confirms that there are no significant changes of positive affects from t_1 to t_2.

The mean scores for the items *motivated, supported, encouraged, active (only t_2), excited (only t_2) and interested* were higher than the mean of the construct PA's respective point of measurement. A maximum development can be found for t_1 and the item *interested* with a mean of $\bar{x}$=4.30, closely followed by *motivated* with $\bar{x}$=4.25. Also for t_2, these two items provide the maximum (*interested* $\bar{x}$=4.26; *motivated* $\bar{x}$=4.00). Reflection with the wiki's help therefore strongly influences the students' motivation for and interest in self-reflection.

The items *determined, active (only t_1), excited (only t_1), proud and enthusiastic* are found below the respective mean values, with *proud* ($\bar{x}$=2.64) scoring the lowest at t_1 and *enthusiastic* ($\bar{x}$=3.0) the lowest at t_2. Figure 6 also shows that the means for *determined, encouraged, active* and *excited* experienced a slight increase after using the wiki. The highest increase can be witnessed for the item *proud*. On the other hand, the item values of *supported* and *interested* drop slightly. A more distinct decrease could be seen for the items *motivated* and *enthusiastic*, with, however, none of all these changes being significant.

For the NA's assessment, it needs to be considered that a low mean value is actually positive since a low degree of negative affect describes only poorly developed negative emotions. *Clueless* with $\bar{x}$=1.21 therefore means that only few students experienced this negative feeling. Figure 10 shows that all means for NA items can be found below the scale middle of 3 and consequently can be considered poorly developed.

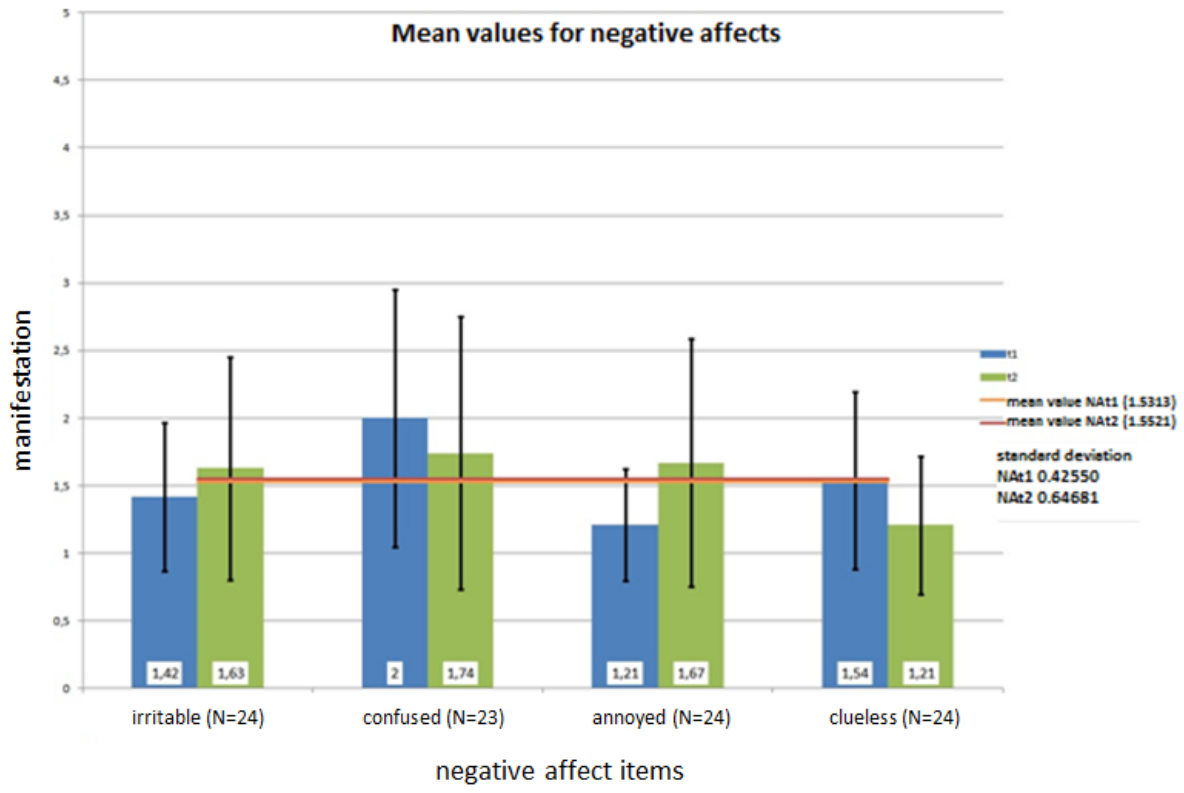


Figure 7: Mean values of reliable NA items. The x-axis shows the NA items and the y-axis their manifestation on a scale of 0 to 5. The bars display the items' values with their standard deviation at t_1 and t_2. The red and orange lines depict the NA mean value at both times of measurement.

The construct NA's mean for t_1 is $\bar{x}$=1.5313 and increased slightly to $\bar{x}$=1.5521 at t_2. These developments before and after using the wiki, however, were not significant. When comparing the means of PA and NA, the NA mean value is below the PA's mean value at all times. This difference is highly significant and confirms that positive affects override negative affects at both points of measurement.

The mean values for the items *irritable (only t_2), confused, annoyed (only t_2)* and *clueless (only t_1)* were higher than the mean of the construct NA's respective point of measurement. *Confused* showed the highest values for both measurements (t_1: $\bar{x}$=2.00; t_2: $\bar{x}$=1.74). Below the respective means are *irritable* (only t_1), *annoyed* (only t_1) and *clueless* (only t_2). The lowest scores were achieved by *annoyed* ($\bar{x}$=1.21) at t_1 and *clueless* ($\bar{x}$=1.21) at t_2.

As the diagram in figure 7 shows, the values of items *irritable* and *annoyed* increased from t_1 to t_2, while the means for *confused* and *clueless* decreased. In the context of a single item analysis, the Wilcoxon test stated significant results for *clueless* ($p = 0.021^* < 0.05$) and highly significant results for *annoyed* ($p = 0.008^{**} < 0.01$). Statistical analysis therefore confirmed significant changes between the points of measurement for these items. A Wilcoxon test had to be used in this case since the data for NA were not normally distributed.

Results for evaluation questionnaire

For the description of results, the percentage share of a total of 25 students who replied to an item with *yes* or *no* will be displayed.

Figure 8 shows the students' estimation of the wiki's effects on their self-reflection skills. More than half of the students (62.78%) indicated a positive effect, while only 16.12% stated that the wiki had no effect on their self-reflection. The highest values could be found for those items that referred to the support and organisation of one's self-reflection through the wiki (76.70% support, 73.30% organisation). Also, the value for the item *I find it easier to reflect with the wiki* was above the mean value of students who agree that the wiki has a positive effect on reflection. Only marginally below the mean were the values for practicing the reflection technique (56.70%) and intensifying reflection (60%) with the concept of the wiki. The item on limitations of reflection, however, yielded ambiguous results. 46.70% of the students did not feel limited while 30% perceived the concept as restrictive (23.30% did not answer this item).

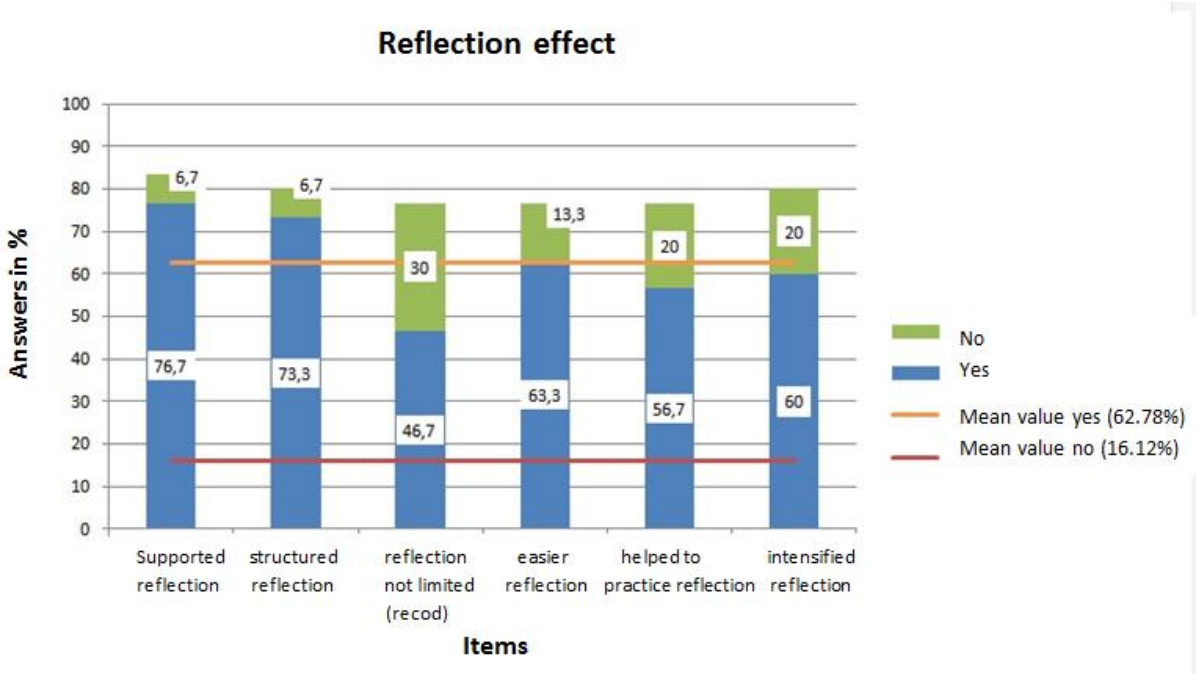


Figure 8: Percentage distribution of answers for the items of the construct *reflection effect*. The x-axis displays the abbreviated items, whereas the y-axis shows the percentage distribution from 0 to 100%. The stacked bars indicate the items‘ distribution, with blue indicating agreement (yes) and green indicating disagreement (no). The red and orange lines show the mean values of the possible answers. Recoded items are marked with *recod*.

As figure 9 illustrates, more than three-quarters of the students (76.70%) stated that they were able to put their reflection results into practice and that they gained confidence in their lessons. 83.30% even said that their teaching abilities improved through working with the reflection concept.

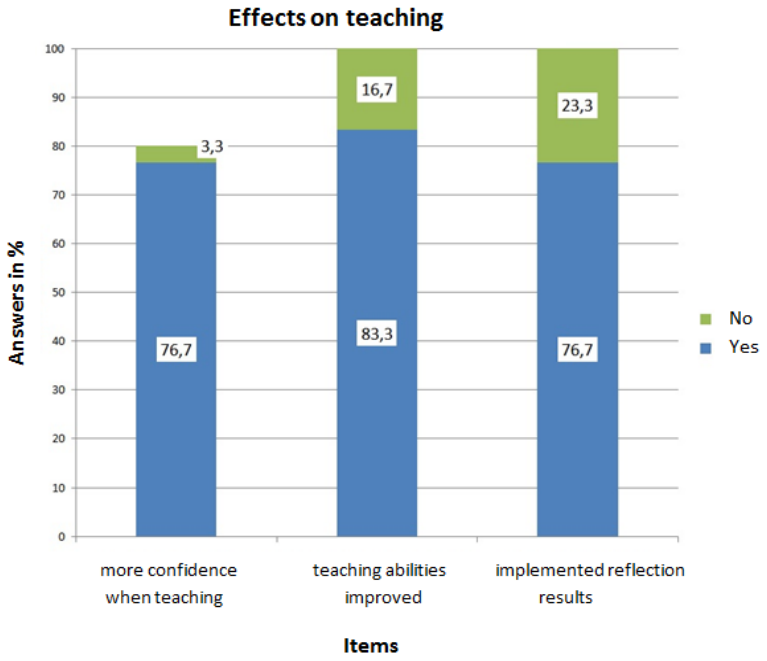


Figure 9: Percentage distribution of answer for the item on the assumed effects on teaching (not a construct due to lacking reliability). The x-axis displays the abbreviated items, whereas the y-axis shows the percentage distribution from 0 to 100%. The stacked bars indicate the items‘ distribution, with blue indicating agreement (yes) and green indicating disagreement (no).

Figure 10 illustrates the users‘ agreement for the items of the *acceptance* construct. Based on the mean values one can tell that 72.20% of the users consider the reflection concept with the wiki as a great idea and accept it. Only 7.70% dislike it. Nearly three-quarters of the students (73.30%) think that the effort is worth it and would use the wiki for self-reflection again. Also, 70% would recommend the wiki to others.

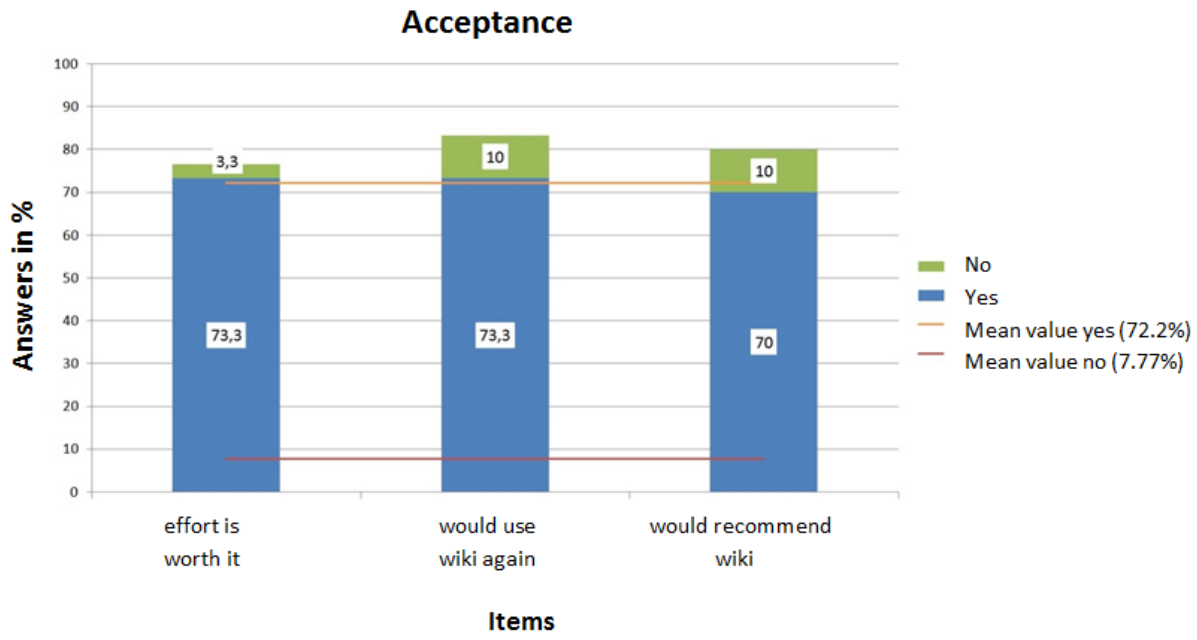


Figure 10: Percentage distribution of answers for the items of the construct *acceptance*. The x-axis displays the abbreviated items, whereas the y-axis shows the percentage distribution from 0 to 100%. The stacked bars indicate the items' distribution, with blue indicating agreement (yes) and green indicating disagreement (no). The red and orange lines show the mean values of the possible answers.

Figure 11 visualises the items of the *design* construct. The mean values display that 66% of the university students like the wiki's design. A particularly high number of students (73.30%) considered the tasks as understandable and the structure as reasonable. Unfortunately, only few users (56.70%) stated that it was easy to find their way through the wiki. With 60%, more than half of the students found the design clear and the handling easy (66.70%).

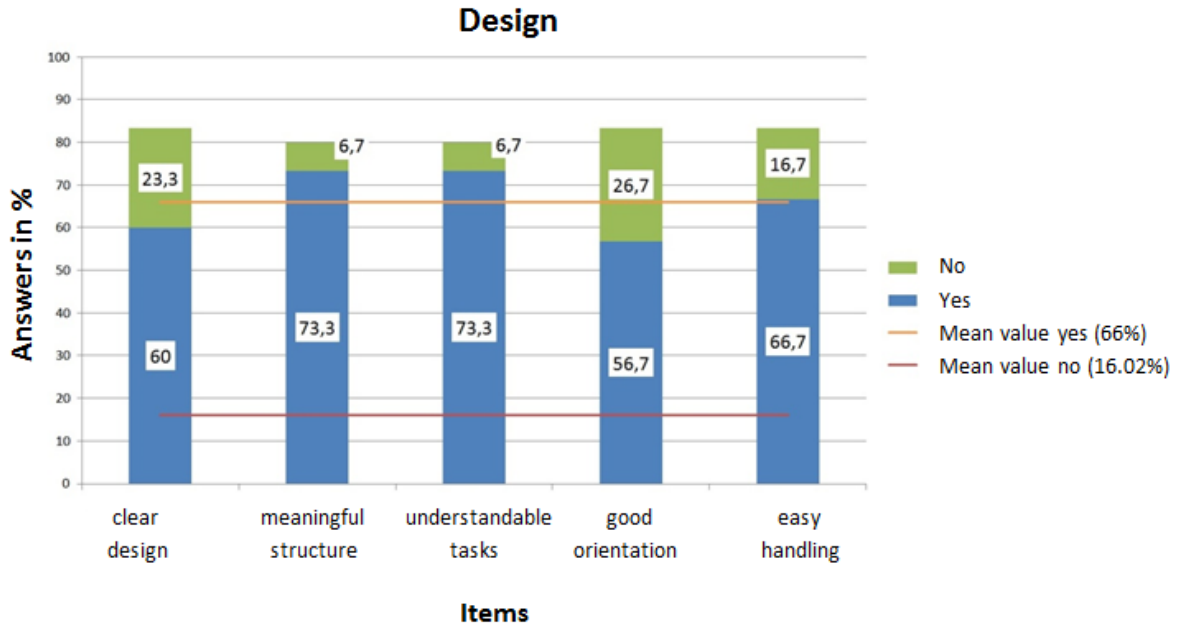


Figure 11: Percentage distribution of answers for the items of the construct *design*. The x-axis displays the abbreviated items, whereas the y-axis shows the percentage distribution from 0 to 100%. The stacked bars indicate the items‘ distribution, with blue indicating agreement (yes) and green indicating disagreement (no). The red and orange lines show the mean values of the possible answers.

Items that were not assigned to the construct *design* but which still surveyed further components of the wiki are displayed in the following diagram (see figure 12). The sample videos (53.30%) and the training categories’ description (50%) were assessed positively by half of the students. It needs to be considered that a third of the students (33.40%) did not make any comments regarding the videos and only 13.30% said they were not helpful. Slightly more than a quarter (26.70%) did not like the scope of the training categories; due to the item formulation, however, one cannot say whether the scope was too broad or too small. The scales were considered appropriate by most students (63.30%).

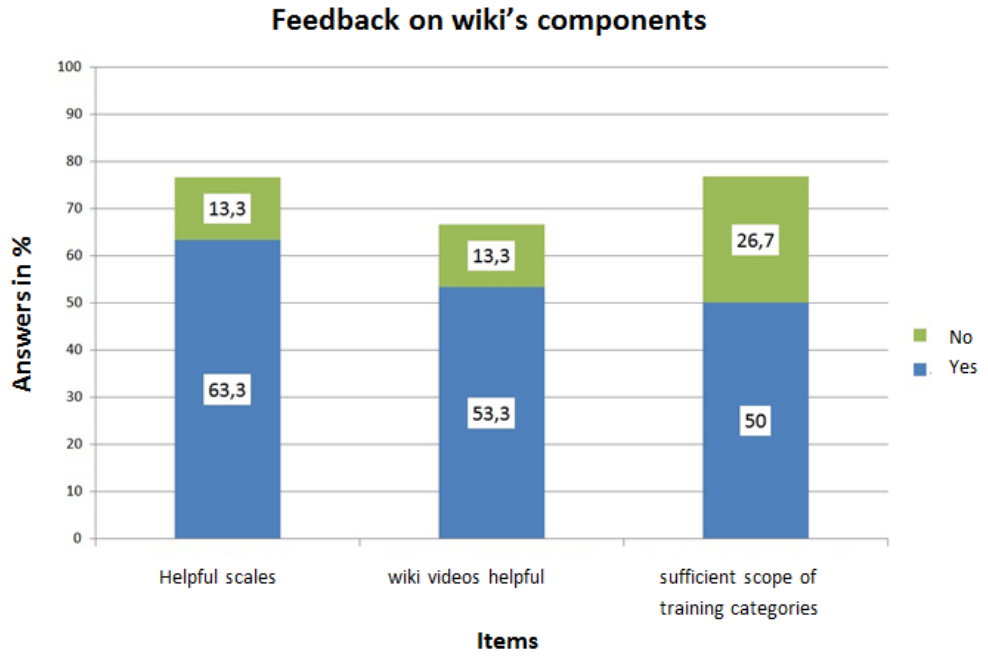


Figure 12: Percentage distribution of answers for the items on the wiki's different components (not a construct due to lacking reliability). The x-axis displays the abbreviated items, whereas the y-axis shows the percentage distribution from 0 to 100%. The stacked bars indicate the items‘ distribution, with blue indicating agreement (yes) and green indicating disagreement (no).

Another diagram (see figure 13) shows two items concerning the self-evaluation of students. The majority of students stated that they watched their lesson video more intensely because of the reflection concept (73.30%) and engaged with their teaching abilities more deeply (66.70%).

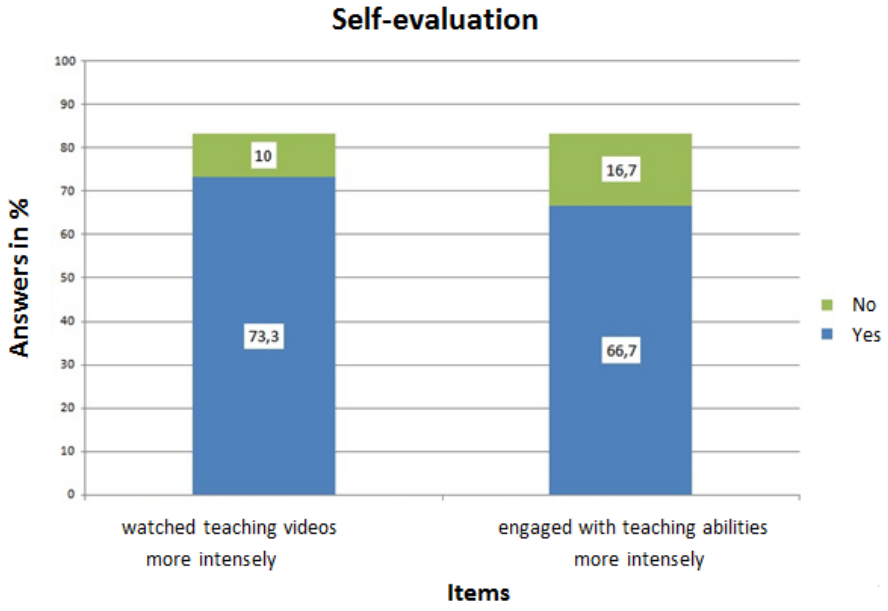


Figure 13: Percentage distribution of answers for the items on self-evaluation of dealing with the concept (not a construct due to lacking reliability). The x-axis displays the abbreviated items, whereas the y-axis shows the percentage distribution from 0 to 100%. The stacked bars indicate the items' distribution, with blue indicating agreement (yes) and green indicating disagreement (no).

Some general remarks on the university course revealed that the course was overall assessed very positively. 76.70% would recommend the course to others and 70% think it serves as a good preparation for teacher training. Three-quarters also said that the feedback for the lesson plans and the supervisor's job was very effective.

For the purpose of working on the introductory part of the wiki, the users spent at least five and up to 120 minutes, the average being 31 minutes. The self-reflection with the help of three tasks could be completed in 15 to 120 minutes (average 35 minutes) which was perceived as a timely constraint by 23.30%.

Discussion

In the following part, the results as displayed before will be interpreted. First, data gained from the PANAS questionnaire will be discussed, and secondly, results gained from the evaluation sheet are the focus of analysis.

Referring to hypothesis I, it can be noted that there is indeed a highly significant difference between the PA's and NA's magnitude after having worked with the wiki. The PA construct's mean is more than twice the NA's value (PA t_2: $\bar{x}=3.6244$; NA t_2: $\bar{x}=1.5521$), so that the first hypothesis can be verified. The self-reflection's obvious effect on emotional affects (both PA and NA) confirms Schülein's and Dewey's theories that reflection always carries an emotional component (Dewey, 1951; Schülein, 1998). Further, the results go along with the findings from Petko et al.'s and Gärtner's studies (Petko et al., 2003, as cited in Krammer & Hugener, 2005, p.

54; Gärtner, 2007), who could also observe positive effects on the emotions of users who learned and reflected with the help of videos.

The test persons connect rather positive emotions with self-reflection, which thus serves as a good precondition for establishing an overall positive attitude and interest regarding self-reflection (Krapp, 2010) and for permanently adopting the role of a *Reflective Practitioner* in their teaching career (Schön, 1983). It is important to make a contribution towards a reflective attitude since the students should be able to improve their teaching abilities already during their studies. That the students will most likely keep on working on their teaching due to positive affects corresponds with Gärtner's results. His qualitative data suggested that positive emotions (like fun, joy and motivation) as generated by video reflection heighten one's courage to try new things and that potential changes in the teaching behaviour are permanent and still subject to being consolidated (Gärtner, 2007).

The high PA-value also indicates that self-reflection is carried out with a high amount of energy, concentration and commitment (Krohne et al., 1996). This seriousness about it is an important prerequisite for self-reflective thinking (Dewey, 1933) and makes for the fact that the students get results from their reflections that will actually help them in their practice and that can be implemented in their pool of knowledge (Schieferle & Schaffner, 2010). Also, the result lets one assume that the setting of self-reflection creates a positive atmosphere of trust and protection which is, according to Gröning, essential (Gröning, 2013).

For the PA being relatively high and the NA rather low, it seems most probable that reflection has indeed caused a behavioural change and that the students do not tend to ignore the reflection results or lower their standards anymore (Kluger & DeNisi, 1996). The high PA that confirmed hypothesis I militate for the wiki's quality.

Fortunately, the setting of a web-based self-reflection wiki lead to the reception of generally positive affects, particularly *motivated* and *interested*, which goes along with Petko et al.'s findings that web-based learning with videos raises the user's motivation, his contentment and perceived benefits (Petko et al., 2003, as cited in Krammer & Hugener, 2005, p. 54). The affects *supported* and *encouraged* are also very important and even though they cannot be found at their maximal value, their means are higher than the mean of the overall PA for both t_1 and t_2. These items in particular reflect the social component of reflection. Supporting and encouraging the students can be achieved through a structured wiki appearance and meaningful tasks. It is also obvious that the supervisors have an essential influence on the affects since they help the students with the planning, conduction and joint reflection of their teaching as well as with any other questions regarding the wiki. As Kilgore finds, a high manifestation of these affects is to be considered very positively as supporting guidance by an instructor and collegial exchange improve the reflection competency (Kilgore et al., 1990). Von Felten also confirms that support throughout a reflection process strengthens the reflection ability and action development (von Felten, 2005).

A reason for the affects *pride* and *enthusiasm* being the least developed might be the study's design. Normally, we are proud if we are content with something we did, so commonly this emotion is associated with achievement (Mayring, 2003). At t_1, however, the students did not yet achieve anything since they had not taught and some had not even finished their lesson plans up

to that point. At t_2, after all, the students have produced several work results: three double periods of teaching, detailed lesson plans and materials as well as a written lesson reflection that might possibly exhibit an improvement of their teaching abilities. This circumstance is presumably accountable for the fact that *proud* undergoes a higher increase than other affects.

The decrease of *enthusiastic* can possibly be explained by the fact that the enthusiasm for self-reflection and working with the wiki expresses itself as pleasant anticipation. Krohne found highly significant correlations of positive affectivity and extraversion (Krohne et al., 1996). Throughout using the wiki, the enthusiasm is likely to decrease since it is not new to the test persons, and they have completed the course at the time of t_2 and do not face the exciting task of teaching and self-reflection anymore. Motivation is also likely to drop when the test subjects do not have a certain reason or purpose to self-reflect anymore after having worked with the wiki (Bovet, 2011).

Again, it has to be highlighted that none of the increases or decreases were of significant extent. Still, the tendencies should be mentioned. Regarding the NA, significant changes could be detected for two affects. A decrease of *cluelessness* or *confusion* is a positive outcome for the reflection wiki as it indicates that the test persons gain confidence about the process of self-reflection. Also, the affect *annoyed* changes, however, into the opposite direction. The increase is partially explainable by the amount of work that has to be put into the course, which does not only imply the lesson preparation as such, but also several working steps in the wiki. The evaluation questionnaire also gives some reasons for the increasing annoyance, such as a poor design and difficulties with the technical handling of the wiki. When evaluating an online video-based advanced training, Ratzka and colleagues too found that the amount of work and handling the technology can often pose a problem (Ratzka et al., 2005).

Regarding the first research question "*Which consequence has the use of the reflection wiki on the user's emotional affects?",* one can conclude that the wiki keeps up the strongly manifested PA and does not cause the weakly manifested NA to increase. Particularly the affects *motivated* and *interested* show a correlation with self-reflection. Users tend to be proud of their work results and also the social affects *supported* and *encouraged* are manifested to a sufficient degree. It has also become apparent that the wiki helps to eliminate confusion about the process of self-reflection; on the other hand, however, dealing with the reflection tasks repeatedly causes an increase of the affect *annoyed*. Still, this affect remains rather low. In the next part, certain reasons and conclusions about this increase will be discussed, which eventually might lead to improvement.

Hypotheses II to VIII need to be reviewed based on the results obtained from the evaluation questionnaire. Hypothesis II "*The wiki helps to improve self-reflection*" can be verified due to the fact that the items concerning the construct of the reflection's effect claimed mostly positive results. This also means that Krammer and Reusser's statements about videos being able to promote self-reflection abilities can be confirmed (Krammer & Reusser, 2005). From the students' perspective, the wiki supports, organises, facilitates and intensifies self-reflection and helps one to become routinized in the reflection process. Particularly the strong manifestation of the items *support* (76.7%) and *organisation* (73.3%) imply that the reflection-wiki is a useful and learnable method which is, according to Hager (2008), indispensable for self-reflective thinking. Also, von

Felten and Kilgore and colleagues found guidance, structuring and support to influence self-reflection positively (von Felten, 2005; Kilgore et al., 1990). The wiki can thus be considered a successful concept regarding self-reflection.

Also, the students' free comments on the evaluation sheet confirm the wiki's positive effects – such as being able to reflect more intensely and more thought-out as well as widening one's reflection horizon and reinforcing attention. All these remarks go along with Mehl's qualitative study (Mehl, 2011). Only 16.12% of the students could not notice any positive effect on their self-reflection. This might be explained with the study results of van Eekelen and colleagues as well as Korthagen and Wubbels. Van Eekelen found that willingness to learn is a key factor in influencing self-reflection. Consequently, those people who have a stronger desire to learn something will learn more (van Eekelen et al., 2006). Presumably, students who did not experience any positive effects on their self-reflection skills did actually not have a real desire to learn something by using the wiki. Korthagen and Wubbels therefore state that internally oriented participants hoping to learn something benefited from the reflection concepts much more (Korthagen & Wubbels, 2002). In a similar manner, Arens states that a prerequisite for promoting one's reflection ability is the existence of the same (Arens et al., 2009). It is particularly those people who already have a certain amount of reflection skills who will benefit most from the wiki. Apart from the willingness to learn, which can be increased by the social climate and appreciative feedback (van Eekelen et al., 2006), some students will eventually profit less than others from the wiki and, due to their dispositional conditions, rather benefit from other settings.

When looking back to the conception of the reflection-wiki, a few crucial decisions had to be made. On the one hand, the wiki aimed at offering the users a structured and economic way for self-reflection, on the other hand, this also meant that reflection could not be as flexible as desired. This would particularly restrict students with a very keen self-reflection competence who do not need as much guidance in the process as other students. These assumptions are reflected in the results of the item "*The wiki restricted me in my reflection since there was little space for one's own reflection aspects*". 30% of the students felt restricted by this, whereas 46.7% did not feel that way. Looking at the free individual answers, it becomes apparent that this restriction was particularly felt in the choice of categories, as the statement "missed out on categories not chosen" was made 24 times. It was still decided to maintain the limitation as by that the students were able to notice improvements in the categories which then pose a motivation to further work on oneself. The results however advise to reconsider this decision and probably offer the possibility to choose new categories for every lesson. Kilgore and colleagues found in their case study that in order to try out new ideas and teaching strategies a certain degree of freedom, as in this case using more reflection categories, has a positive effect on the self-reflection competence (Kilgore et al. 1990).

Hypothesis III "*The wiki helps to improve teaching skills*" can also be confirmed since a majority of students said that they were able to implement their reflection results, that they became more confident during teaching and overall could improve their teaching abilities. From the student teachers' viewpoint, the integration of the reflection wiki into the "Kolumbus-Kids" courses therefore brings about an effective concept for the improvement of teaching abilities. This conclusion is further strengthened by some test persons' statements such as "one could focus more strongly on correcting weaknesses", "one can learn about oneself", "through the examples, one can intensely deal with one's own competences" and "one was able to work out aspects that could

be approached the next time teaching". Once again, these opinions go along with findings from other researchers' studies. Krammer's case study, for example, confirmed a measurable learning success through the usage of web-based videos (Krammer & Hugener, 2005). Also Wackermann and colleagues were able to show that videography affects the level of teaching actions (Wackermann et al., 2008). According to the study about the evaluation of online advanced training courses for mathematics teachers , a crucial factor for success is trying out what one has learned in one's own teaching (Szymanski & Bruder, 2012), which is also inherent to the concept described in this article. Prenzel and Seidel as well as Krammer and Hugener suggest that structured task instructions, which will shortly be confirmed in hypothesis IV, have a decisive influence on the subjective learning success as could be identified also in this study (Seidel et al., 2005, as cited in Hosenfeld, 2010, p. 31 and Krammer & Hugener, 2005).

Both aims, namely improving the wiki users' self-reflection and teaching abilities, have thus been reached. Hardly any test person said not having gained confidence in teaching (3.3%), whereas still 16.7% think that their teaching abilities did not improve and another 23.3% were unable to implement their reflection results. Prenzel and Seidel could show that working with teaching videos is more efficient if the persons have already had experiences with videography (Seidel et al., 2005, as cited in Hosenfeld, 2010, p. 31). As described before, the practical experiences of the test persons were heterogeneous and it is therefore possible that students who are experienced in lesson reflection and in working with lesson videos will have noticed a higher benefit than inexperienced people. It is easily conceivable that these will also benefit from the wiki's concept once they become more practised.

Also, regarding Hypothesis IV "*The wiki is well-accepted by the users*" the wiki can be considered a success since the students think the effort for reflection is worth it and they would also recommend the procedure to others. Krammer also found a high acceptance of web-based learning with videos in his case study (Krammer & Hugener, 2005). Presumably, the high, subjectively felt learning success as confirmed in hypothesis III contributes to the wiki's acceptance.

Since the students consider the wiki as "sufficiently meaningful" and thereby show a positive outcome of emotional quality of experience, the prerequisite for the development of interest, as put forward by Krapp, is also fulfilled (Krapp, 2010). Given the fact that the teaching course and concept fits the students' occupational interests, learning is even more successful, as Blömeke states (Blömeke, 2009). The students' attitude towards the reflection wiki is therefore very positive and it is advocated to use the wiki in future "Kolumbus-Kids" courses.

However, the wiki's importance is rated quite differently by the students. Many say that the personal conversation with the supervisor and fellow students are fundamentally more effective, whereas others say that the video analysis was most helpful. These two opinions show how individual learning and reflection are (Hager, 2008) and once again emphasise the importance of having both joint reflection and individual reflection in the wiki after each lesson.
Only 7.7% of the students did not show a high acceptance of working with the wiki. Reasons for that might be technical difficulties (Krammer & Hugener, 2005). Hosenfeld and Helmke confirmed that the willingness to cooperate will have a positive influence and knowing one's own teaching style will have a negative influence on the perceived benefits (Hosenfeld & Helmke,

2008). It is thus possible that students who did not regard the wiki as beneficial already have had a clear picture of their teaching and did not feel the urge to reflect when they were watching their video.

Since 66% of the users assessed the wiki's design as positive, hypothesis V "*The wiki is designed in a user-friendly way*" can also be verified. Mehl's study also figured that the design of the learning software was assessed very positively and fortunately went along with the students' way of working (Mehl, 2011). Guaranteeing learning success depends on instructions, guidance and orientation says Mayer (Mayer, 2001, p. 161ff.). Also, Seidel et al. (2005, as cited in Hosenfeld, 2010, p. 31) and Krammer and Hugener (2005) confirm the importance of structured task instructions and a meaningful guidance and orientation. Regarding the instructions, the item "*the task instruction is understandable*" achieved very good results. Guidance and orientation were assessed equally good as could be seen from the items on '*meaningful structure'* and '*easy handling'* as well as free student comments ("I always knew which task to do next", "clear instructions for reflection", "easily understandable, very intuitive"). Results on a clear design and for the item "*I found my way around the wiki easily*", however, were not that distinct. The discrepancy of the items might be due to the fact that the wiki's structure and setup are obvious to the students, but that slight difficulties occurred when navigating between the pages, e.g. caused by the arrangement of buttons. Some students also criticised that there were too many menu items and subitems which made it hard to orient themselves within one category. All in all, the orientation in the wiki is therefore in need of improvement.

Further items on the wiki's components revealed that 63.3% found the scales very useful and liked that the graphs illustrated both the assessment from the supervisor and from oneself. Roughly 50% of the students thought the exemplary videos were helpful, which confirms Krammer and Hugener's findings that appropriate videos are a key factor for the learning success.

Students also praised the initial summary of the reflection with a supervisor (the first reflection task), but did, however, not like the second reflection task that much since selecting certain moments in the video was sometimes a bit tedious. The attractiveness of this task definitely has to be increased because Krammer and Hugener could show that inspiring learning tasks for working with lesson videos are indeed decisive for the learning success (Krammer & Hugener, 2005).

It will certainly also be of interest to survey additional items and open questions in the future in order to determine which details still need to be worked on. Moreover, the results confirm hypothesis VI "*The wiki encourages an intense examination of one's own teaching video*" and hypothesis VII "*The wiki encourages an intense examination of one's teaching skills*".

Hosenfeld's study results obviously show that intense involvement also comes from the personally perceived benefits through videography that have already been confirmed in hypothesis IV (Hosenfeld & Helmke, 2008).

Admittedly, the verification of hypotheses VII and VIII must be treated with caution since there was only one item each. Still, comments like "one pays special attention to certain abilities" and "one deals with the lesson very intensely by using the wiki" support the verification. It has to

be emphasised that the wiki only encourages an intense involvement, but cannot necessarily cause it. So, also comments like "the wiki can also be handled quickly and inattentive" could be read. Szymanski and Bruder's study on online advanced courses for mathematics teachers found that an intensive involvement and the practice of teaching abilities will lead to the intention of further implementing the acquired knowledge (Szymanski & Bruder, 2012). Hosenfeld, too, could show that the reflection's intensity influences the intention to improve one's teaching (Hosenfeld & Helmke, 2008).

The last hypothesis "*The student teachers assess the "Kolumbus-Kids" course positively"* can be verified. The contents ("good preparation for teacher training"), the supervisor's job and the feedback on lesson plans have been regarded very positively mostly so that the course is overall recommended to others. The students consider the course with its components lesson planning, supervision during writing lesson plans, teaching, support through the supervisor and both joint and individual reflection as an inherently consistent concept.

When discussing the temporal strain that the reflection concept caused, one has to note first and foremost that the students stated timespans from 5 to 120 minutes. Firstly, it can be assumed that students regarded it as a heavy burden time-wise when they needed up to two hours for the reflection. Secondly, one has to keep in mind that the item "*the wiki was an additional temporal strain*" does not necessarily connote negatively.

In this sense, it becomes clear that some students are willing to make the effort and are happy with their results afterwards ("reflection never takes too long"). Taking 30 minutes for the introduction and 30 minutes for each lesson reflection with the wiki is a completely acceptable amount of work for that kind of course. The problem of the effort being estimated as too high, as Ratzka and colleagues found in their evaluation, could not be observed with the reflection wiki. Thus, the condition "enough time" as put forward by Krammer and Hugener for successful web-based learning (Krammer & Hugener, 2005) holds true.

Conclusively, the second research question "*How is the wiki's reflection concept assessed by the users?*" can be answered as follows: the users review the wiki as overall very positive, nonetheless some improvement suggestions were made.

The students think that the wiki improves their self-reflection and general teaching skills, but that it on the other hand restricts them too much in some ways, such as the choice of categories and the maximum of characters for the memo function. Apart from the various positive emotions that have been described to occur during self-reflection (PANAS), the wiki was regarded as cognitively meaningful and was therefore widely accepted by the test persons. Altogether, the wiki is very user-friendly; particularly the tasks, the design, the evaluation page and the sample videos were highly appreciated by the students. Still, optimisations within in the categories, the arrangement of questionnaire links as well as the second reflection task are wished for. The concept makes for a more intense reflection and engagement with teaching skills and is still economical due to its time scale.

Conclusion and outlook

Once again, the results discussed previously will be summarised and the wiki will receive a concluding review. The reflection wiki ensures positive affects being associated with self-reflection. Besides the emotional advantages, good results could also be achieved from a cognitive

viewpoint, thus backing positive effects on teaching, acceptance, design and a positive evaluation of the "Kolumbus-Kids" courses. The overall result of the present evaluation thus follows the track of Krammer's findings on web-based learning with videos: predominantly positive effects on the users' knowledge and emotions became apparent (Krammer & Hugener, 2005).

Regarding the evaluated aspects, the wiki seems to be of high quality for the users and it can be assumed that the mediation of teaching skills and self-reflection will be optimised by using the wiki. Further, the wiki strengthened the development of a positive attitude towards lesson reflection and helped to adopt an attitude similar to a *Reflective Practitioner* (Schön, 1983). By that it supports the student teachers in contemplating about their teaching in a self-reflective manner in order to improve as a teacher. In view of the results it is recommended to keep on using the wiki with minor changes in future "Kolumbus-Kids" courses.

Further evaluations and discussions about the wiki's details should be maintained, particularly regarding the reflection tasks, since there was only little data obtained about that in this study.

After having evaluated the reflection concept from the users' point of view, the next step would be to focus on the more objective question whether the users actually improved their teaching skills, since various researchers have already found a discrepancy between the benefits perceived by the users and the actual learning success. The supervisor's and fellow students' assessments as well as the teaching videos could be used for that undertaking. It would also be interesting to investigate a possible correlation of the skill improvement and the time spent on reflection (Wegner & Remmert, 2014).

A comparison of the scales that have been completed by the student teacher and the supervisor respectively could give some indication of whether the self- and external assessment happen to converge throughout the reflection sessions (Wegner & Remmert, 2014). By implementing further questionnaires and by placing personality tendencies, also attitudes and their changes due to practical experience could be researched.

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