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Integration of Best Practices and Requirements for Preliminary E-Learning Courses

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***Abstract*—**This study will examine how IT practitioners can be motivated for IT studies and which kind of support they need during their occupational studies. Within this research project, the challenge of supporting students being engaged in business for several years arose. Here, it is especially important to successfully guide them through their studies. The problem of this group is that they finished their school education years ago. In order to gather first experiences, preliminary e-learning courses were introduced and tested with a group of users studying General Management. They had to work with these courses and have been questioned later on about their approach to the different methods. Moreover, a second group of potential students was interviewed with the help of online questionnaires to give information about their expectations regarding extra occupational studies. We also want to present best practices and cases in e-education in the subarea of mathematics and distance learning. Within these cases and practices, we use state of the art systems and technologies in e-education to find a way to increase teaching quality and the success of students. Our research indicated that the first group of enrolled students appreciated the new preliminary e-learning courses. The second group of potential students was convinced of this way of learning as a significant component of extra occupational studies. It can be concluded that this part of the project clarified the acceptance of the e-learning strategy by both groups and led to satisfactory results with the enrolled students.

***Keywords*—**E-learning evaluation, self-learning, virtual classroom, virtual learning environments.

I. Introduction

IN its projects, the University of Applied Sciences Weserbergland has done research in the field of possible implementations of e-learning techniques for future student requirements. It also fits very well to the e-learning implementation strategy that is expected to find out the parts best appreciated by students to support and extend existing e-learning content. This approach is meant to gain new learner groups and is supported by a research project in cooperation with the German Federal Ministry of Education and Research. In this joint project the University of Applied Sciences Weserbergland and the Darmstadt University of Technology have researched the expectations IT practitioners have regarding their part time courses.

The long-term evaluation of the new study offer focus on the flipped classroom approach for distance learning. The intention is to combine virtual classrooms and the inverted classroom approach more efficiently to support the blended learning approach at our university. In order to gather valuable information about the requirements of part time students, it is vital to understand potential students. Thus it is necessary to plan und fulfill the requirements for the e-learning offers.

Within the first practical test for the preparation of the research project, it was decided to offer these parts of mathematic-related courses which caused the highest percentage of failure at our university.

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II. Related Work

A. The Use of Blended Learning

The term *blended learning* refers to different approaches. Blended Learning can be defined as a combination of instructional modalities or media delivery, as a combination of instructional methods or as a combination of online and face-to-face instructions [1]. Within the current project blended learning will be understood as the thoughtful integration of classroom face-to-face learning experiences with online learning experiences [2]. The benefit of blended learning is given by its pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness and ease of revision [3]. During the last decades blended learning has changed from traditional distance learning with televised courses, videotapes or cassette recording to the use of Internet-based applications. Since the mid-1990s´ dominance of the worldwide web, blended learning has offered the possibility to communicate synchronously and asynchronously [4]. Due to this ways of interaction blended learning can be enriched with ongoing support during the distance learning period. Following this change new issues have come up: the most important one is that the instructor needs to be prepared for the students´ attitudes and requirements which might result in the change of curricula.

An important change in teaching within the blended learning approach was the integration of the inverted classroom model. By this approach, the practical focus of blended learning is supported in the most valuable direction.

B. Inverted Classroom Model

With the inverted classroom model, instructors can provide a practical usage for the participant and focus on the desired outcome [5]. Beside the discussion of questions regarding handouts or textbook, the outcome focusses on a practical result, e.g. to be prepared for discussions or to be able to make an experiment.

At the beginning, the inverted classroom model has included the use of video tapes, DVD players or downloadable media files [6]. With the ongoing improvements of Internet technologies, students are able or even have to watch podcasts

or videos instead of only reading a book for their class preparation. This includes the shift of the learning activity from outside class to an in-class and outside class scenario. That approach can be supported by the use of virtual classrooms, which are highly recommendable for synchronous interactions. Virtual classrooms help to receive feedback regarding students´ performance in course-related activities and to motivate them to engage in active learning [7]. In the virtual classroom, participants can use different online features for communication. The features mostly used allow the use of archiving the session, to view each other and to use chat features [8]. For blended and distance learning, this offers an institution to support their students in a better and enhanced way than traditionally. As an extension for a virtual classroom, the mentioned podcasts can be used. They are also known as learning or video nuggets, which help to prepare and support students during learning and teaching. Preliminary and special videos for content delivery [9] can support a lecture itself. Running between five and ten minutes, the videos are available in a duration which allows a student to learn more efficiently for a defined topic [10].

In this research case, the usage of learning nuggets, the inverted classroom approach and the support of students by a virtual classroom are the fundamental pillars for the increase in learning quality and learning outcome.

III. Mathematics as Occupational Course

Courses in which students have to be motivated to calculate and use mathematical formulas for business administration are still a huge challenge to the university. Due to its experiences with remedial and mathematic courses in our dual studies, the University of Applied Sciences Weserbergland decided to increase the quality and support of mathematics related courses.

Next to the existing target group, there is an additional focus on the new one of part time students. These students mostly only have a professional background without any academic qualification. This includes their level of qualification. Usually people studying at a university in Germany have to provide their A levels. Due to certain legal changes in Germany, also people with secondary school certificates and professional experiences are allowed to study at German universities within the field of their professional experiences.

For people without A levels, the university environment has to provide support to allow them to succeed their studies. The researching university gained its first experience with this target group in the new part time courses in the field of business administration. For those students, learning nuggets were introduced as support medium. The structure and several settings were changed in the course offer, too. These changes were implemented due to prior experiences with student groups, their feedback and additional requirements based on best practices at the university and additional learning organizations.

A. Mathematics I – Part Time

Because of the very positive evaluations by students in mathematic courses and the well appreciated use of new media in the classroom, it was decided to test the new approach within part time studies. That new approach with virtual classrooms and extended learning nuggets was implemented from January to April 2015. The question was: *During their first semester in a blended distance learning scenario, how can students be supported with the help of rapid e-learning?*

For in-class lectures of mathematics state of the art digital media has already been used and new e-learning technologies have been introduced. Writing down all lecture content on a touch screen to display it to the class with the help of a multimedia projector instead of using a blackboard is just one example. Such a presentation can be recorded in the class, and provided to the students of this course using the central LMS (Learning Management System). With this approach for lecture recording, the students also obtain all notes being made by the lecturer. Moreover, this solution intends to shut out any disturbing factor e.g. persons, lectures and so on. The verbal student feedback on the recordings was positive as well as on the combination with the LMS at the university. The LMS allows students to directly discuss the recordings and to publish questions related to the lecture. For part-time classes, a similar approach could be applied, but a lecture itself should be avoided. Due to the distance and lack of time, it was planned to split the lecture content in small learning nuggets which contain the sketching of formulas and their calculations. Similar to the learning videos from J. Lovicach [11].

A small student group of 15 learners made it possible to include the approach of the inverted classroom. The inverted classroom approach from V. Langer and F. Schimanke [10] displayed a successful acceptance of these learning methods by the existing target group. It was the first step to integrate e-learning content more effectively into the learning approach of the university. Furthermore, the production of the e-learning content was facilitated by rapid e-learning techniques. For the production of these learning nuggets and for the first run of the new *Mathematics I – part time,* course subject areas of *Gauss algorithm* and *Finance Mathematics* were selected, see Fig. 1. They were favored because of their compact scope and the possibility to rapidly convert them into e-learning content. In the online course itself, it was not planned to provide any online exercises. The students were still forced to work with the material directly. Some nuggets had exercises at the end. The students had to solve the problems by themselves and the following video provided the corresponding answers. For each exercise, a learning nugget was produced. The learning nuggets were bound together as a video playlist and provided as an online stream as well as downloadable content. To offer support for the solving of problem-statements coming from exercises, a virtual classroom was provided. In this context the university suggests weekly based online meetings in Adobe Connect. The classes are normally used to virtualize presentations. In language classes the classrooms are also used by language trainers for individual support to improve students´ pronunciation. For virtual mathematic courses it was

decided to use similar techniques.

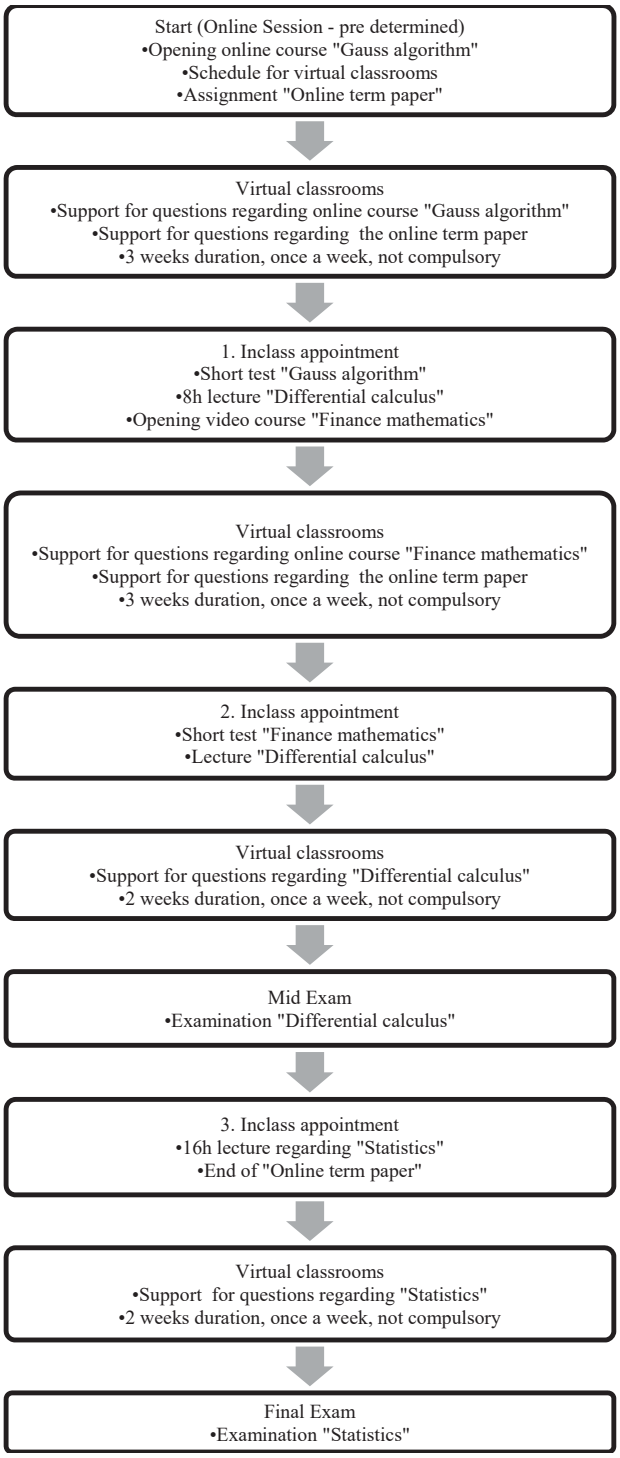

Fig. 1 Lecture scheme "Mathematics I – part time"

During the first online lectures the following preconditions for the virtual classrooms have to be set and agreed to. Virtual classrooms are not compulsory and free to attend, which is important to allow the students to feel free and be motivated to participate. During the first session it was also voted that each virtual classroom would be recorded to allow absent and attending students to reflect the lecture in a more efficient way. This voting is mandatory due to the German data protection law.

Beside the virtual classroom a forum was provided in the LMS by the university to gather questions and ideas for upcoming virtual classrooms sessions and to provide the link for the previous virtual classroom sessions. Each session in a virtual classroom had a standard duration of 45 up to 60 minutes. During the semester an average of 10 out 15 students participated in each online session. In this case the virtual classroom was only used to discuss questions regarding the term paper, the content of the videos or the calculation of additional mathematic problems. So the virtual classroom was similarly used as a normal classroom in a flipped classroom approach. The discussion was supported by the attending professor, but focused on an exchange between students. This way the self-learning approach and the reflection of their own thinking were supported.

To finish the course students were required to fulfill five different kinds of test. Beside the traditional exams during mid-term and at the end of the course, the students had to sit two short tests about the content of the video learning nuggets and to provide a term paper on a mathematical topic, which was supported online. In present case the selected mathematical topic was *statistics*. Within the field of statistics, the students were forced to write a term paper about the usage of scales in statistic context. At the end of the class the final grade was set out of the grades resulting from the different exams, tests and the term paper, see Table I.

TABLE I
NEW ASSESSMENT SCHEME "MATHEMATICS I – PART TIME"

Test content	Max. Points	Share final grade
Based on Online content		
Short test "Gauss algorithm"	25	20%
Short test "Finance mathematics"	25	
Online term paper	50	
Based on in class activities		
Exam "Statistics"	100	40%
Exam "Differential calculus"	100	40%
	Total	100%

For traditional students we were working with a final exam which represented their final grade. For the occupational studies this was a new approach.

It was also completely new that no in-class time was offered before the short tests were written. All information and questions had to be dealt with online. Regarding the results of the short tests, the success rate of our students was surprising. In general, it was not possible for a student to fail a single test due to the approach of cumulating the points to the final grade.

The maximum points for a single test were 25 points, on the whole 100 points could be reached.

For this course the results were excellent and the collected point rate was far higher than with normal fulltime students when they finished the short tests as a trial examination, see

Table II.

TABLE II
SCORE SCHEME SHORT TESTS "MATHEMATICS I – PART TIME"

Test subject	Gauss Algorithm	Finance Mathematics
Maximum points	25	25
Minimum points	20	18
Average short test result	23.2	22.6

Learning nuggets had not been provided for the in-class students yet. Based on the test results it is also considered to provide these learning nuggets for them. To make sure that the video had a learning impact, a separate short evaluation was carried out to check the actual usage of learning nuggets by students.

B. Acceptance of Learning Nuggets

In order to understand the acceptance of the learning nuggets in a more profound way, existing part-time students were questioned in a short survey. They all belong to the sector of business administration. It was assumed that their experiences would be similar to those which the new target group of IT-practitioners would face during their part-time studies. Similar to already existing part-time students, the new target group will mostly have professional work experiences. The questions were mainly set up as simple yes/no questions and free text answers to receive a fast and valuable feedback from the students. According to existing experiences the educational level will also be similar. The completion of the questionnaire was voluntary.

Out of the 15 possible participants 14 returned the survey. 13 out of this 14 people had used all videos regarding the Gauss algorithm and 12 had viewed all videos regarding Finance mathematics. In the following only those students who watched all videos were considered. All students accepted the recommended video order and it turned out that most of the participants had attended their last mathematic classes more than three years ago, see Table III.

TABLE III
TIME BETWEEN LAST AND CURRENT MATHEMATIC LECTURE

Years	1	2	3	4	5	6	7+
Amount of students	1	0	4	0	1	2	4

In addition, all students preferred the video support more than the use of a book. Only one student requested a book, but not as a replacement of the videos, only for extra support. Regarding the question whether students would change their learning behavior the next time they had to visit a similar class, the response was that they might focus more on the video to train their calculation skills. The qualitative response to the question how the students would rank the quality of the videos and the additional online learning material, was mostly positive, see Table IV.

Table IV shows two results: First video and e-learning content can be used to support the learning process¸ second videos and e-learning contents are mostly considered as good and not as *very good*. Furthermore, it was helpful to learn that all students agreed 100% to time scheduling, and both video sections were perfect and long enough to learn the content by watching the videos. In addition, the students requested extra courses for the calculation of remaining debt and investment calculation. Any other recommendations for changes were not made by the students.

TABLE IV
STUDENT RATING FOR E-LEARNING MATERIAL

Rating	Gauss algorithm	Finance mathematics
Very Good	4	-
Good	8	11
Average	-	1

The results of the student survey were directly used to redefine the structure of the preliminary course *Fit in Mathematics*. This course was offered to existing students as well as to part-time students for the first time. Here this course set was especially designed to meet the educational requirements of the new target group. It was expected that they need more mathematical support due to the time period between their current studies and their last mathematic classes.

C. Redefining ´Fit in Mathematics´

For new students, in part- and fulltime studies the University of Applied Sciences Weserbergland provides a preliminary course in the field of mathematics. In the past this course was mainly used for full time students with the result that no student has successful passed the in-class pretest *Fit in Mathematics*. When they passed the course, the scores mostly ranged between 50% and 80% of the points and when they failed it strongly was recommended to attend the additional in-class preliminary course. Between the test and the in-class course no additional learning sources were provided, see Fig. 2.

For the new target group, it was planned to change this course offer in a more convenient and part-time oriented direction. Within this change, a mixture of preliminary and support courses is chosen, see Fig. 2. The change was initiated in the field of the part-time mathematics courses where learning nuggets were tested. The in-class time for *Fit in Mathematics* was reduced. In-class students had to sit a test and afterwards only the course structure was explained. In the first online course sample answers for the in-class test were calculated in video nuggets. The second course contained extended e-learning content. These two online courses were defined as a precondition before a student could participate in an in-class course. During the first online course the requirements for the standard academic mathematic level were provided. The setup of the course followed the online learning session of Mathematics I – part-time class. If a student is successful in this online course, the student can skip the in-class preliminary course. In the case that a student did not attend advanced mathematics at school, an additional online course was provided which presents fundamental basics in the field of mathematics. As a last step, the traditional in-class preliminary course mathematics was offered to those students who were not able to increase their understanding for

mathematics with the offered online courses. This new approach for *Fit in Mathematics* will also be used for the new target group of IT-practitioners. It is expected that their needs in the field of mathematics should be fulfilled in the best possible way. In spite of it all, it is not sure that the expectations concerning the new target group will be met without researching this new target group.

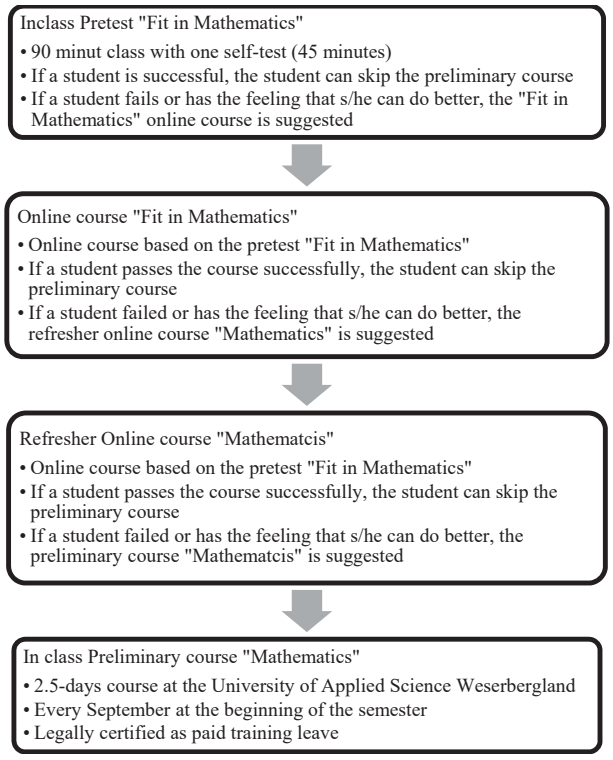

Fig. 2 Class scheme "Fit in Mathematics"

IV. Occupational Studies for IT-Practitioners

Considering the results of the investigation into the quality enhancement in the field of mathematics and e-learning, it was necessary to research the new target group of IT-practitioners in more detail.

The new study will offer part-time studies similar to the existing offer in the field of business administration. The new course will focus on business informatics. It will allow students to transfer existing knowledge from prior education or work experience into the study. This knowledge will be credited as ECTS and thus reduce the duration of studies. Apart from these transfer possibilities, the university also has to focus on new and additional preparatory courses. These courses will be offered at the end of 2016. This might also apply to two new offers: Bachelor of Arts in Business Informatics and Master of Arts in IT-Business Management.

A. The Open IT Target Group

Due to the shortage of academically trained and skilled employees in the field of information technology, it is important for the Federal Republic of Germany to train employees in this field more efficiently. The target group for our new study offer has a professional background in the area of *IT-Professionals*, which is a practical master degree (a further training subsequent to an apprenticeship) in IT in Germany, or they are *qualified IT-specialists* with a vocational training as a system integrator or an application developer. For the underlying research there is a focus on the mentioned professions. If the research shows that other professions should be taken into consideration, the scope might change in the long term.

In order to better understand the expectations and concerns of enrolled and potential students, a questionnaire based on prior research projects was developed in cooperation with the Darmstadt University of Technology. Additional pre-qualified interviews with possible students and supporting companies were in addition realized to reflect the questionnaire and to increase the level of understanding. The finished questionnaire focused on research questions regarding expectations, lecturers, learning content, learning offers and support concepts. To consider the e-learning strategy the inquiry focused on questions which ascertain the preferred teaching styles of the participants and how they understand e-learning. In addition, the demographic data of the participants could help to understand their personal background in more detail.

The survey was distributed to two different kinds of possible target groups for the planned study offer. For this the survey was duplicated and distributed separately. The first group contained IT-practitioners already working; the second group were IT-practitioners currently undergoing the training for the practical degree as *IT-Professionals*.

The first survey for participants currently working was published between April and Mai 2015 and distributed via email, related social networks and forums. This survey was spread in addition by the members of the advisory board of Open IT, including the organization of DEKRA Certification, BITKOM (German Association for Information Technology, Telecommunications and New Media), the Federal Institute for Vocational Education and Training (BIBB), The Association of German Chambers of Industry and Commerce (DIHK) (which is responsible for the education of IT specialists in Germany) and the Industrial Union of Metalworkers (IGM) (within which IT practitioners are mostly organized). The feedback rate for this first survey was quite low in relation to the efforts spent on the distribution of the survey. Nevertheless, if a participant started on the survey, it was mostly completed. Out of the 269 started data sets 170 were completely filled out. Out of these 170 data sets we could identify 146 as usable. The non-usable data sets were deleted, because the answers were implausible. The analyses of the data sets showed a huge amount of very young people currently in their first training or still pupils in schools with an IT related subject. All the young people did not fit our target group of IT-participants. Therefore, these data sets were separated and used as an additional set to detect the expectations of young pupils with an IT related education. For the main analysis 86 people were selected. At the time of the survey they were employed and had undergone an IT related

training prior to this. 36 out of those 86 people are prospective students who plan to study in the near future. The remaining 50 were non-prospective students who currently do not plan an additional study in the field of IT.

The second survey was provided between May and June 2015 to students of an educational company which focuses on teaching the degree *IT-Professional*. This company has subsidiaries in Hanover, Hamburg and Berlin and covers the north and east of Germany. The survey itself was provided by this company to ten learning groups. About the professional background of these learning groups it has to be mentioned that five student groups had a civil background and the other five a military one. Due to the fact that the students were in their exam period, the feedback rate was quite low. 38 persons started the survey and 35 finished it completely. Out of those 35 data sets no data had to be deleted due to unqualified data.

Nearly 90% of the participants were male. Almost 40% of the whole survey group have a professional background in the field of IT with a dedicated focus on application development or system integration. 13 persons out of the 35 would like to do an additional study. 22 participants have not yet planned an additional study in the field of computer science.

Consequently, the differences between the four groups, Prospective Students - Open Survey, Non-Prospective Students - Open Survey, Prospective Students - IT-professionals, Non-Prospective Students - IT-professionals, had to be investigated.

B. Results Regarding e-Learning

As mentioned above the survey focused beside e-learning also on the expectations of possible students for study offers. This includes their requirements for support and consultation, the reasons why they have not taken up studies so far and their motivations for studies. The data analyzed showed that there is a great affinity for e-learning, because the interviewees set great value upon the importance and the requirements for e-learning in a question set. The participants could rate on a 6-likert scale their preferences for items which are related to study offers, see Table V.

TABLE V
PREFERENCE LIST

	Prospective Students - Open Survey	Non-Prospective Students - Open Survey	Prospective Students – IT Professionals	Non-Prospective Students – IT Professionals
Tuition fee	1	1	9	10
E-Learning	2	4	3	7
Duration of study	3	5	6	3
Distance to university	4	3	2	1
Offered class type	5	8	1	2
Individual support	6	10	3	3
Accessibility of lectures	7	7	7	5
Specialization	8	9	8	9
Reputation of the institution	9	6	5	7
Study breaks are free of charge	10	2	9	6
Alumni	11	11	11	11

Another result given was that the preferences may change between the groups. However, for some items like e-learning, the rating is always on a similar level. In each group, E-learning is in the upper third of the preferences. The second other important item is the distance to the university.

As can be seen in the preference list, e-learning seems to be a good pillar of education and qualitative good e-learning is a key offer to possible students. By clearly communicating the offered e-learning services it might be possible to attract new students and motivate them to sign up for courses which are offered by a university. In addition, expectations could be confirmed that a mixture of distance and classroom learning is the most accepted teaching style for our target group, see Table VI.

The participants in the open survey overall prefer a class type which supports a mixture of distance and classroom learning. The same selection is also preferred by the IT-Professionals, see Table VII.

The high results for the combination of both teaching styles, valuable distance learning and good in-class learning, display that those requirements might fulfill the planned approach for distance and in-class learning.

TABLE VI
PREFERRED TEACHING STYLE – OPEN SURVEY

	Prospective Students - Open Survey	Non-Prospective Students - Open Survey
Distance Learning	36.00%	36.10%
Classroom Learning	18.00%	27.80%
Mixture of distance and classroom learning	80.00%	69.40%

TABLE VII
PREFERRED TEACHING STYLE – IT-PROFESSIONALS

	Prospective Students	Non-Prospective Students
Distance Learning	15.40%	18.20%
Classroom Learning	46.20%	63.60%
Mixture of distance and classroom learning	92.30%	77.30%

Additionally, arguments for e-learning were requested in free and optional text answer fields. The response rate was quite high. Therefore, similar answers could be extracted the more so as it was conspicuous that the responses provided

such an analogy, see Table VIII. These answers documented that e-learning is considered as a technique which supports flexible learning. It might be astonishing that most of the people considered e-learning to become independent of time and location. The expectation that more people give practical examples like e-learning is family-friendly or that repeating would be easier stayed unconfirmed. It seems that e-learning as a service is well appreciated. In the group of IT Professionals in training, similar responses were given, see Table IX. This group also confirmed that e-learning stands for flexible learning.

TABLE VIII
ARGUMENTS FOR E-LEARNING – OPEN SURVEY

	Prospective Students	Non-Prospective Students	Overall
Flexible learning (timing/location)	18	8	26
Updateability	4	2	6
Repeating is easy	4	2	6
No driving time	3	2	5
Easier studies during work	2	2	4
Family-friendly	1	2	3
Perfect for standard content	1	-	1
Advanced learning methods	-	1	1

TABLE IX
ARGUMENTS FOR E-LEARNING – IT-PROFESSIONALS

	Prospective Students	Non-Prospective Students	Overall
Flexible learning (timing/location)	3	14	17
Repeating is easy	2	-	2
Advanced learning methods	-	2	2
A wide range of topics	-	2	2
Low cost	-	1	1

It was remarkable that none of the interviewees of the target group IT-professionals mentioned *No driving time* as an advantage for e-learning. Especially as the point *distance to university* was a highly ranked reason to select a university. It might be possible, that this is included in the term *flexible learning*. It was also interesting that the updateability was mentioned by both groups.

The question regarding *arguments against e-learning,* was not a mandatory field either. This might explain the low percentage of overall feedback on this field, which was only filled out by nearly 15% of the participants, see Table X.

The other group showed similar results. Here it was interesting that most feedback was provided by IT-professionals who did not consider a future study, see Table XI.

All in all, it seems to be important that the interaction with the lecturer is a serious issue which must be taken into consideration. This might be related to the answer that the content has to be learned alone and is only supported by the computer. As mentioned in some answers, a high learning discipline of students is necessary. An additional question asked the participants about their self-assessment of their self-study skills. They were requested to do a self-assessment, on a 6-likert scale from highly undisciplined to highly disciplined, see Tabled XII and XIII.

TABLE X
ARGUMENTS AGAINST E-LEARNING – OPEN SURVEY

	Prospective Students	Non-Prospective Students	Overall
Interaction with lecturer is missing	4	5	9
Learning alone	5	1	6
Discipline is necessary	4	1	5
Communication only via computer	3	1	4
Content must be presented clearly	2	-	2

TABLE XI
ARGUMENTS AGAINST E-LEARNING – IT-PROFESSIONALS

	Prospective Students	Non-Prospective Students	Overall
Interaction with lecturer is missing	-	6	6
Communication only via computer	2	3	5
Content must be presented smart and structured	-	3	3
Discipline is necessary	1	2	3
Learning alone	-	2	2

TABLE XII
SELF-STUDY SKILLS – OPEN SURVEY

	Prospective Students	Non-Prospective Students
Highly undisciplined	0.00%	0.00%
Undisciplined	4.00%	2.80%
Rather undisciplined	12.00%	30.60%
Rather disciplined	32.00%	27.80%
Disciplined	32.00%	27.80%
Highly disciplined	20.00%	11.10%

TABLE XIII
SELF-STUDY SKILLS – IT-PROFESSIONALS

	Prospective Students	Non-Prospective Students
Highly undisciplined	0.00%	4.50%
Undisciplined	0.00%	9.10%
Rather undisciplined	23.10%	27.30%
Rather disciplined	38.50%	40.90%
Disciplined	38.50%	13.60%
Highly disciplined	0.00%	4.50%

For both groups, it can be said that the prospective students obviously find themselves more disciplined. It seems that self-discipline increases with the decision to study. The results for the IT-professionals were slightly surprising, because nobody regards him/herself as highly disciplined. The reason for this behavior is not clear, so it has to be considered for additional further research. It might be related to their past professional background and their work for the German army.

V. FUTURE RESEARCH

Regarding future research, the focus in this paper was on the ongoing analyses in the usage of e-learning and the implementation of e-learning methods as well as techniques

for the new target group. Both approaches should consider the usage of blended learning aspects. Future studies had to follow the research questions: *How can video content be presented in a more interesting way to students and how can the quality of rapid e-learning content be increased?*

To address this question, the University of Applied Sciences Weserbergland decided to initiate an e-learning project together with the students. Due to the high effort required for the production of e-learning content, the project is done by fulltime students during their project study classes. During this two-semester class, the students have the possibility to test their project management and individual skills on real projects with a real outcome. These projects can be requested from the business partners of the university as well as from internal coworkers and departments of the university. For the project of the research project Open IT, students should work in a project dealing with the development of e-learning content. Apart from the production of e-learning content, it will be investigated how story telling could enhance the quality of e-learning offers and how additional presentation formats could look. To receive valuable enhancements regarding the quality increase a research on MOOC platforms is planned. The suggestions should be used for male and female students in the age between 25 and 35 years.

During their research the students have to follow the basic research questions concerning learning nuggets: "*Can Best Practices be identified for the transfer of learning content into video nuggets?"* and "*How can presentations be integrated more smoothly*?" As outcome for those questions a suggestion list is planned which also included a corporate design for learning nuggets. Those suggestions and results should be tested directly with the reproduction of existing videos to increase their quality. In the first step the quality increase will focus on the sector of learning nuggets in the field of cost and management accounting, financial accounting and controlling. In this field a small amount of learning series existed, which were produced in the past in cooperation between the University of Applied Sciences Weserbergland and the University of Applied Sciences Ruhr West. These videos were selected, because the video content was mostly finished, which reduced the effort of a reproduction. The video set itself needs to be reproduced, because they do not meet the current quality requirements anymore. They contain green screen spill and conversion mistakes during the post-production. In addition, the sound quality needs to be improved.

By the end of 2015, the learning nuggets for the financial sector be finished and best practices be identified. It is planned to transfer the results into the new video nuggets for differential calculus in the field of mathematics which should be finished by mid 2016 for the next *Mathematics 1* course. In order to extend mathematics courses the students should also consider the usage of quizzes.

A side benefit of the student-project could be that a different approach of communication exists between student to student or lecturer to student communication. Furthermore, at the end of the student-project the outcome should include a process map for the production of e-learning content. This will be important to increase the processes in the sector and to reuse them.

VI. Conclusion

With the existing approach to implement video learning nuggets and the flipped classroom approach in the e-learning strategy, the expectations of customers and students were mostly met. During the research the information received showed that the right way was taken to fulfill the requirements and expectations of the new target group.

The current and further implementation of e-learning content needs more investigation in the direction of the reception of e-learning content. For the future development process, it is necessary to understand the requirements of students regarding the presentation of learning content. An additional question is how students prefer their media consumption and which media channels should be supported. This might include the research on new media distribution channels and the usage of best practices in the sector of social media.

In the long term the ongoing process map should help to understand how to make the production more efficient. This would allow the production of more target group oriented e-learning content in the near future. In addition, it is necessary to continue the implementation of e-learning content for existing and new courses, like the implementation of statistics in the field of mathematics.

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