

# Cross-country Analysis of the Usage and Impact of Digital Technology on the Students Behaviour in Germany and in China

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## Abstract

This paper presents the key findings of a cross-cultural survey conducted among a sample of 203 German and Chinese students analyzing the effects of new technologies, digital media and innovative methods in higher education from the student's perspective. The study explored the similarities as well as differences between students from Germany and China towards the acceptance, usage and attitude of new approaches and tools in their academic life. Additionally, the impact of these innovative methods and tools on the students' image perception of their home university was also analyzed. For the survey being conducted in late summer 2017, the Lime Survey online-tool was used. The empirical results showed that all participants were familiar with new technologies for learning, but the intensity of the usage at the two universities differed. The Chinese university (Huazhong University of Science & Technology) had frequently more interactive and virtual elements in teaching, whereas the German university (Baden-Wuerttemberg Cooperative State University) focused more on the traditional way of lecturing and used innovative technologies less often. In both countries, the university support and the teachers who use these new tools and approaches had a positive impact on the university image. The paper sums up the core results of this initial cross-cultural study. Moreover, several educational implications are derived and limitations are discussed.

**Keywords:** Higher education in Germany and China, new technologies and approaches in the classroom, digital media, innovative tools, intercultural learning and teaching

## Introduction and Educational Background

The technological progress and the ongoing change in higher education have a strong effect on the ways how teachers are organizing and doing their works and how students learns

and consume the provided knowledge base by their university. Thus, these major changes demand a rethinking of the traditional learning methods and the recent education system [1]. In the Educause's ECAR Study of Undergraduate Students and Information Technology 2017, the students' usage of technology was investigated in detail [3]. Students evaluated their general campus technology experiences as positive. When it comes to deal with technical problems, students often figure out solutions by their own. Students' opinion about their instructors' appropriate usage of new technology in the classroom are parted. The majority of students said that most of their teachers have adequate technical skills, use new technology to enhance learning, and encourage the implementation of collaborative technology tools [4]. The study also confirmed that only a few universities already inserted new technology for advanced learning tasks (e.g. hybrid learning environments), whereas the majority concentrates to apply these new tools for simple tasks in the learning context (e.g. using the learning management system as a more advanced "up-/ download-center"). Furthermore, the study confirmed a growing number of students preferring a blended learning environment [3]. By using innovation and advanced technological concepts in the classroom, the needs of the digital native generation can be met and the teachers have a broader toolkit for teaching and promoting positive learning effects. These changes provide great possibilities for academic institutions. Distance education or the so called e-learning, sophisticated learning management systems (LMS) – virtual learning portal for students and teachers – and the opportunity to collaborate from around the world are just some of the transformational benefits that universities are embracing [6; 17]. Distance learning or e-learning is a formalized learning system specifically designed to be carried out remotely by using electronic communication tools. This kind of learning is less expensive to support and is not constrained by geographic considerations. It offers opportunities in situations where traditional education has difficulty operating. Students with scheduling or distance problems benefit because it is more flexible in terms of time and can be delivered virtually anywhere. It also provides for professors new ways of (virtual) teaching. [1].

In the recent years, lots of empirical studies have been conducted which are focusing on the effects of new technology in the classroom. To analyze the evidence of self-instructed learning forms, e.g. like e-learning in comparison to classical teaching methods, Peine and his colleagues (2016) carried out a study investigating the learning effects and student satisfaction level of new and traditional teaching methods with 223 German students. The study showed that the participants (in particular, the e-learning group) achieved significantly better results through modern self-instructed methods than through classical methods [20]. In China, Lai & Mao (2014) examined factors influencing the mobile learning of undergraduate students in Chongqing. The self-efficacy of mobile learning of the participating students was very high and most of them thought that they have the ability to use mobile devices as well as mobile learning. A negative factor was the little encouragement and motivation to use mobile learning from teachers and schools. The authors suggested that there is still a lot of work to be done to promote the utilization of mobile learning. Additionally, teachers and schools should invest more energy and effort to improve the learning style and learning effect in China [14]. *Until today, not much attention has been paid to comparative study designs on technology in higher education between different countries and cultures. It is important to see the variations in using technology at higher education institutions and between various cultures in order to identify possibilities and develop a culturally adaptive approach [1; 26; 27].*

Nowadays, students have high expectations towards their academic education and therefore higher education institutions have to offer more student-centered learning

environments. Particularly, certain flexibility with respect to the learning location and the content are important as the contact and cooperation with peers [9]. Adapting new technology and innovative learning methods into the teaching process helps to meet the challenges of digital age. The current generation of students is very familiar with new technology and they use them instinctively [25]. These so-called “digital natives” have no digital boundaries set between private and academic life. *By integrating digital media and innovative technologies effectively in the curriculum, the students’ needs can be fulfilled and a more individual learning and teaching can be offered* [1]. *A new approach in this field is the usage of mobile learning analytics* [10; 21; 23]. By implementing e.g. mobile apps to evaluate the personal learning process, the current needs in studying and the performance of professors after each lecture can be analysed. Moreover, the students give almost a real-time feedback towards their current study-situation. This data is collected, anonymized and analysed by intelligent algorithms. The key results are submitted to the professors nearly at the same time and can be exploiting to adapt the current lecture and with respect to the future also the curricula. This new concept is currently tested at two German universities in a research project funded by the government. The first results show the positive benefits of mobile learning analytics in higher education very remarkable. So, the researchers were able to show that mobile devices for studying are highly interesting for the participants. Furthermore, the students like the idea of tracking their own performance and learn data over a longer time period [13].

*Emerging from the digitization trend in higher education, also the professors’ roles must be adapted to the new technological development. Modern approaches like the TPACK approach help to understand the teachers’ new role. The TPACK methodology emphasizes how the variables of teachers’ understanding of content, pedagogy, and technology interact with one another to produce effective teaching* [11]. The model had a strong impact on theory, research, and practice in teacher education and higher education professional development [11]. The TPACK model suggests that lecturers should have deep understandings of the *content knowledge* referring to their teaching subjects as well as a *pedagogical knowledge* about the variety of instructional practices, strategies and methods to promote students’ learning. The *technical knowledge* is the third component of the TPACK model. The technological knowledge refers to the teacher knowledge about traditional and new technologies that can be integrated effectively into the curriculum. Thus, a professor 2.0 has to be motivated to use new tools in the teaching content. *According to the TPACK framework in higher education, technological pedagogical content knowledge should be used by lecturers to develop appropriate and context-specific teaching strategies and to develop learning environments which promote students’ motivation and learning performance* [11].

The annually published Horizon Report of the New Media Consortium analyzes upcoming trends, challenges, and effects of modern technologies in higher education. The last report (2017) presents best practice approaches for the appropriate usage of new methods and tools at different universities across the globe [1]. It emphasizes that universities should be more geared and structured in ways of promoting idea exchanges, identifying successful teaching and learning strategies for the modern world of business and rewarding teaching innovation. Moreover, educational institutions have to deliver intensive, active learning experiences and skills-based training units using technology in meaningful ways [6]. Web-based communities of practice, virtual multi-disciplinary student groups, and virtual learning teams are effective concepts in this area [1]. Online, mobile and blended learning concepts are used across the world, but access to such learning remains unequal. Existing gaps are hampering college completion rates for student groups by socioeconomic status, race, gender or ethnicity.

Additionally, web access also remains uneven in some countries or regions. Most institutions apply new technologies, including learning apps or learning management systems (LMS) to enrich the traditional training environment on campus [17]. However, in many cases, the technology-driven learning and teaching strategies of universities focus on 'silo-solutions'. Therefore, training must be extended beyond gaining separated technology skills towards generating a thorough understanding of digital environments, enabling interactive learning to new contexts and co-creation of content with others. Hence, lecturers should select their favored methods wisely with regard to their students' needs. Nevertheless, lifelong learning is the lifeblood of higher education and the organizations should prioritize and recognize the important trends for their stakeholders [1]. *Regarding these aspects, a great mixture of mobile learning, blended learning concepts, and virtual teaching approaches is necessary for higher education nowadays and in the future. Virtual courses enable interdisciplinary knowledge sharing across the world and beyond the physical campus. For instance, mobile learning becomes very popular in the academic world and many empirical studies analyzing the impact of the usage of mobile learning confirmed positive learning outcomes of this method [7; 3].*

*Moreover, the professor's role has to be adapted to the new technological requirements. Modern approaches like the TPACK (Technology Pedagogical and Content Knowledge) framework help to understand the new teacher's role. The TPACK approach emphasizes how the connections among teachers' understanding of content, pedagogy and technology interact with one another to produce effective teaching [11].*

The model suggests that teachers should have deep understandings of the content knowledge referring to any knowledge that the person is responsible for teaching and the pedagogical knowledge about the variety of instructional practices, strategies and methods to promote students' learning. The technology knowledge is the third essential element of the TPACK model. The technological knowledge refers to the teacher knowledge about traditional and new technologies can be integrated effectively into curriculum. According to the modern students, a professor 2.0 is needed being encouraged to use these new tools in teaching [11]. *Additionally, a professional skill set of pedagogical, cultural and technological competencies for lecturers are required and systematic guidelines for learning and teaching are must-have in the academic world [1].*

### **Cultural Background of Germany and China**

Education plays a very important role in Europe and Asia. Investing in the young generation by providing a wide range of educational possibilities is essential to generate competitive advantages for the countries and their societies. The educational systems in Germany and in China show some differences. With almost 2.4 million annual graduates from bachelor degree and diploma programs at regular tertiary education institutions by 2004, China has the largest education system in the world. The importance and perception of higher education in China has changed during the last decades. The governmental investments in the academic sector are also high. China has now a lot of high-class universities and the research and practical implementations are also on a top-level. Nowadays, as the educational level has increased, many Chinese students do a master degree at a domestic universities or study abroad at a leading international universities in the United States or in Europe to gain the relevant skill set needed for the global job market. Thus, Chinese parents support their children intensively from early childhood on to increase the chances to study [18].

The educational system in Germany also developed positively within the last decades. Whereas the tertiary graduation rates increased, they are still below international average [19]. The governmental investments in higher education and systematic changes in this field helped Germany to enrich the learning and teaching quality in general. New programs, innovative approaches and higher standards for universities helped to develop the educational sector in Germany. The last years, the German government regularly supported projects which develop and evaluate innovative pedagogical and technological concepts focusing on digital learning or learning via mobile devices. The Baden-Wuerttemberg Cooperative State was also supported by the government to test new approaches in teaching students with modern technologies inside and outside the campus. Various empirical papers analyzed the effects of new technologies in different German educational systems with the key results that the right technology enhances students' learning and performance [e.g. 13; 22]. Moreover, a lot of funding programs and the low studying fees for public universities make it possible that a lot of young people can go to university in Germany. The support by the parents to encourage the children to study is comparable with the situation in China. Nevertheless, the learning culture and educational philosophy in the two countries are different. The importance of these aspects is in China higher in comparison to Germany as latest study results revealed [18; 19]. In Germany, the educational system is decentralized and each state is responsible for the universities in its regions. Thus, differences among the various universities across Germany are possible because each state has its own policies [19].

The teaching and learning habits in the two countries show differences. In European, educational theory currently favors a constructivist approach, where students construct (build) their own knowledge, merely facilitated by the teacher and is conceived as more contemporary. European students tend to believe academic success is primarily related / attributed to innate ability. Asian students tend to attribute understanding and hence academic success primarily to effort and teachers are treated with utmost respect. A dominance of a factual view of knowledge among teachers and learners can be seen as a domination of its cultural context [16]. Due to a more open and connected academic world, the educational approaches in higher education in China become modern and innovative methods or tools are used, e.g. Mobile App Assisted English Learning [15]. *These differences in higher education may lead to a partly diverge perception of the acceptance and usage of new technologies and tools in studying. In addition, it can be assumed that certain influences, e.g. the support of the teacher, have a different importance. Overall, new technologies can be used to offer more flexible teaching styles in both countries. To close these gaps, governments, universities and global institutions have to work together and initiate global programs to promote the implementation and appropriate use of technology and digital learning environments in higher education* [1]. For a deeper understanding of the impact of new technologies in higher education in Germany and China, an empirical study was conducted in late summer 2017. *Thus, this empirical paper aims to investigate similarities and differences in the usage and acceptance of new technological tools and innovative methods as well as their impact on the university image at two different universities in Germany and China to gain deeper insights in this educational field.* The next chapters sum up the goals, the design, the core results and the implications of this cross-country study.

## **Research Questions and Study Design**

A quantitative method approach was selected for the empirical study. It comprised a quantitative online-survey via the Lime Survey tool. The sample consisted of 133 German students from the Baden-Wuerttemberg Cooperative State University and 170 Chinese students from the Huazhong University of Science & Technology. The total sample size was 303 participants. The main goal of the survey was the detection of similarities, but also of cultural differences between the two student groups concerning new technologies and innovative tools in higher education. Moreover, the general attitude towards their university and personal data were analyzed. With respect to the study design, the following research questions were asked in this study:

1. *Which new technologies do the students usually use at their university and what are their wishes and needs for the future?*
2. *What are the students' experiences with innovative technologies during their school (teenage) years?*
3. *How can the students' attitude towards different cultures and experiences with other cultures be assessed?*
4. *How do students evaluate their own and their teachers' competence level when using new technologies?*
5. *Which recommendations can be derived with respect to the involved stakeholders (students/lecturers) and the image of the university?*

## **Sample**

For the empirical study, 133 German bachelor students with a focus on business and management and 170 Chinese students from business administration and engineering were selected. A more expanded view on cultural differences was given by the two locations of the participating universities (Germany and China). In late summer of 2017, the students took part in the online-survey. While the German sample consisted of 82 female and 51 male students, in the Chinese sample were 99 women and 71 men. The average age of both groups of participants was 22 years and all students were between their 2<sup>nd</sup> to 6<sup>th</sup> semester.

## **Empirical Results**

This section gives an overview of the main results of this cross-cultural project with respect to the stated research questions. Within the scope of the questionnaire, the students were asked about the following topics: (1) Attitude towards their university and their technical support; (2) General usage / acceptance of digital media and new technologies; (3) Evaluation of specific tools (e.g. learning apps), the own intercultural competences and the technological experiences in school; and (4) Personal data. Within the questionnaire, only closed answer formats and seven-point Likert scales were used. The items and ranking scales were chosen for the survey design had to meet with statistic quality criteria [8]. The statistical analysis was conducted with the IBM-Software SPSS version 23.0. The results were calculated by descriptive analysis (mean, variance, standard deviation) and logistic regression.

*According to the first research question, both student groups were asked which technologies or technical equipment they ordinary have access to and which devices they use or would like to use mainly for studying. 88.0% of the German students had access to their own PC or laptop, 36.1% of them had a tablet and more than 4 of 5 students (82.7%) were smartphone-*

users. The situation of the Chinese students was similar: 87.1% of the Chinese students had an own PC or laptop, 34.1% had a tablet, but just 64.7% were smartphone-users. Surprisingly, only a quarter of the students (28.6% of the German and 21.8% of the Chinese students) would like to use tablets frequently for learning or in the lecture. Also similar results were confirmed in the current use of own PC or laptop for lecturing (69.9% of the German and 64.1% of the Chinese students), the students' attitude towards tablets (14.3% of the German and 14.1% of the Chinese students) as well as smartphones used for lectures (43.6% of the German and 51.8% of the Chinese students). By teaching students how to use mobile devices and learning apps effective in academia, the learning support potential of these new tools can be leveraged enormously [15; 7]. However, table 1 and figure 1 present the different requests the Chinese and German students have and which equipment they would like to use most frequently for lectures. The participants could answer this question with "yes" and "no" and multiple answers were possible.

Table 1: Equipment the German and Chinese students would like to use frequently in lectures

|   | German students<br>(N= 133) |      | Chinese students<br>(N= 170) |      |
|---|-----------------------------|------|------------------------------|------|
|   | N                           | %    | N                            | %    |
| <b>Please indicate the technologies which you like to use in lecturer. Multiple answers are possible here</b> |                             |      |                              |      |
| 1 Own PC or laptop  | 74                          | 55,6 | 91                           | 53,5 |
| 2 Company PC or laptop  | 34                          | 25,6 | 15                           | 8,8  |
| 3 Tablet (e.g. iPad)  | 38                          | 28,6 | 37                           | 21,8 |
| 4 PC or laptop provided by the university   | 29                          | 21,8 | 20                           | 11,8 |
| 5 Smartphone (e.g. iPhone, Samsung)   | 22                          | 16,5 | 69                           | 40,6 |
| 6 E-reader (e.g. Kindle)  | 8                           | 6,0  | 14                           | 8,2  |
| 7 Other devices with internet access<br>(e.g. smart-watch)  | 4                           | 3,0  | 3                            | 1,8  |

Additionally, both student groups had to assess the usage of learning apps and mobile devices for higher education. All students showed a positive attitude towards learning apps and mobile equipment in general as well as enhancer for learning. Generally, both groups had a better attitude towards mobile devices (combination of four questions: mean of German students 3,9172 / mean of Chinese students 5,2117) than towards learning apps (combination of four questions: mean of German students 3,5921/ mean of Chinese students = 5,0882) for studying.

To indicate the motivation though new technologies in higher education Table 4 sums up the students' results of using mobile devices and learning apps for learning. Chinese students rated new technologies as learning motivator higher than the German students. They also assessed mobile devices and learning apps almost the same, whereas German students prefer mobile devices instead of learning apps as learning motivator. The future of applications for learning is high – as recent studies also show [1; 15]. *Thus, the universities and the professors in each country have to encourage students for "learning via apps on the go". However, these kinds of tools are only supplements and do not replace established teaching and learning methods.*

*Regarding the second research question, the Chinese and German students were asked about their further experience with technologies in their youth.*

Figure 1: Top 3 Technologies German and Chinese students would like to use frequently in lectures.

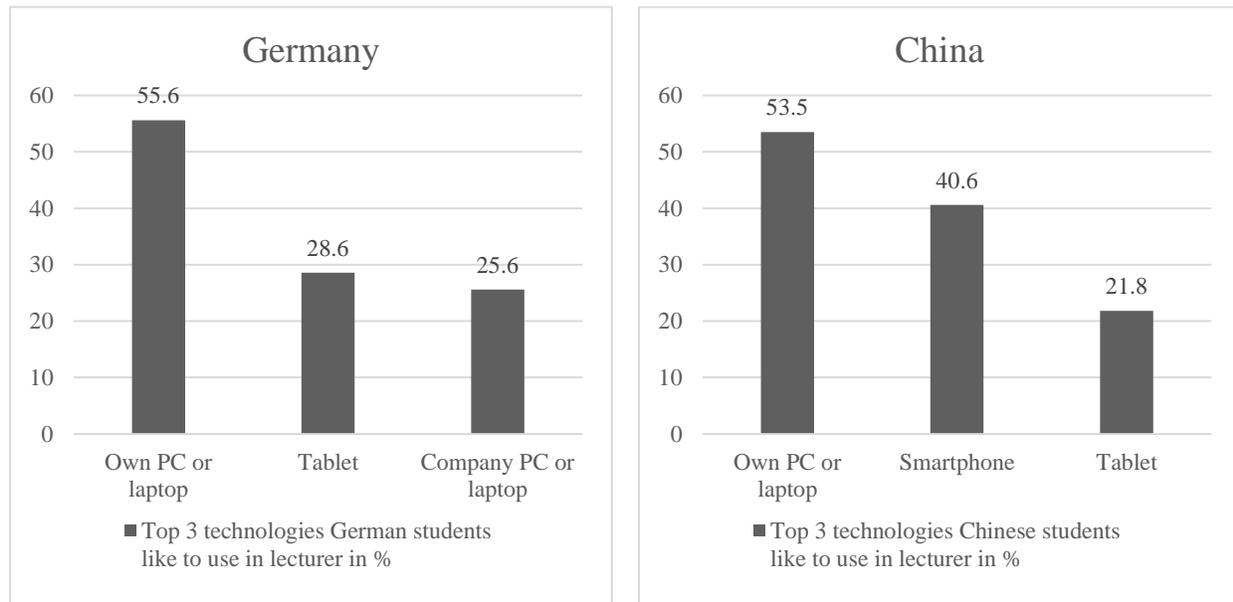


Table 3 presents the results of the students' answers on a Likert scale from 1 ("strong disagreement") to 7 ("strong agreement") in the survey. The combined mean of all six questions shows a stronger socialization of Chinese students (combined mean 5.1824) in comparison to German students (combined mean 4.2644). Important insights are the common high usage of technology for homework (question 1) and the relative poor communication of media literacy in German schools (question 5). Increased media literacy in the school could result from China being exposed to unprecedented global competitive pressures and thus motivated to provide high quality technical education to students [18].

Table 2: Evaluation of mobile devices and apps in higher education among the sample

| Please indicate the following statements regarding mobile learning technologies in higher education.   | German students<br>(N= 133) |        | Chinese students<br>(N= 170) |        |
|--|-----------------------------|--------|------------------------------|--------|
|  | Mean                        | SD     | Mean                         | SD     |
| 1. Using a mobile device, e.g. a tablet, for studying would be an appealing learning motivator for me. | 4,2105                      | 1,6789 | 5,3176                       | 1,3209 |
| 2. Using learning apps for studying would be an appealing learning motivator for me.                   | 4,0676                      | 1,7632 | 5,3529                       | 1,2423 |

To answer the third research question, the participants had to evaluate their intercultural knowledge and the satisfaction regarding the use of new technologies in their universities. Both participating groups rated their cultural knowledge very high and German (combined mean of all questions 5.5414) as well as Chinese students (combined mean of all questions 5.7255) is on the same level. These results underline the growing importance of cultural knowledge in a global

thinking world. Particularly, intercultural communication and a mutual understanding of each other are indispensable factors for the continuance of the society [3].

The next chapter wants to answer the fourth research question. The students' satisfaction level with the IT-support by their home university (combination of five questions), their own technical competence level (one question), and their perceived teachers' competence level when using technology in the lectures (combination of two questions) are shown in table 5. The participants stated their level of satisfaction on a Likert scale from 1 ("very dissatisfied") to 7 ("very satisfied") in the survey.

Table 3: Socialization with media in the youth of German and Chinese students

|  | German students<br>(N= 133)   |    | Chinese students<br>(N= 170) |        |        |        |
|--|---|----|------------------------------|--------|--------|--------|
|  | Mean  | SD | Mean                         | SD     |        |        |
| <b>Please evaluate your further experience with new technologies and the internet in your family / in your youth (approximate age: 13 to 18 years)</b> |   |    |                              |        |        |        |
| 1.   | I consciously used a computer, the internet or other new technologies for the purpose of homework.  |    | 4,8120                       | 1,6658 | 5,2882 | 1,5052 |
| 2.   | The usage of a computer, the internet or other new technologies for school-related obligations was supported by my parents.                                     |    | 4,2180                       | 1,7027 | 5,1824 | 1,4903 |
| 3.   | Generally, my parents were well informed about how to use a computer, the internet or other new technologies for the purpose of learning/receiving information. |    | 4,0226                       | 1,7471 | 4,7588 | 1,6873 |
| 4.   | During school days, I used a computer, the internet or other new technologies for the purpose of learning/receiving information.                                |    | 4,6015                       | 1,7186 | 5,3647 | 1,5640 |
| 5.   | In school, I learned how to use digital media and new technologies (e.g. as a learning aid).  |    | 3,7368                       | 1,7833 | 5,3059 | 1,4018 |
| 6.   | In school, I communicated and cooperated with my classmates via using digital media or other new technologies.  |    | 4,1955                       | 1,8523 | 5,1941 | 1,5663 |

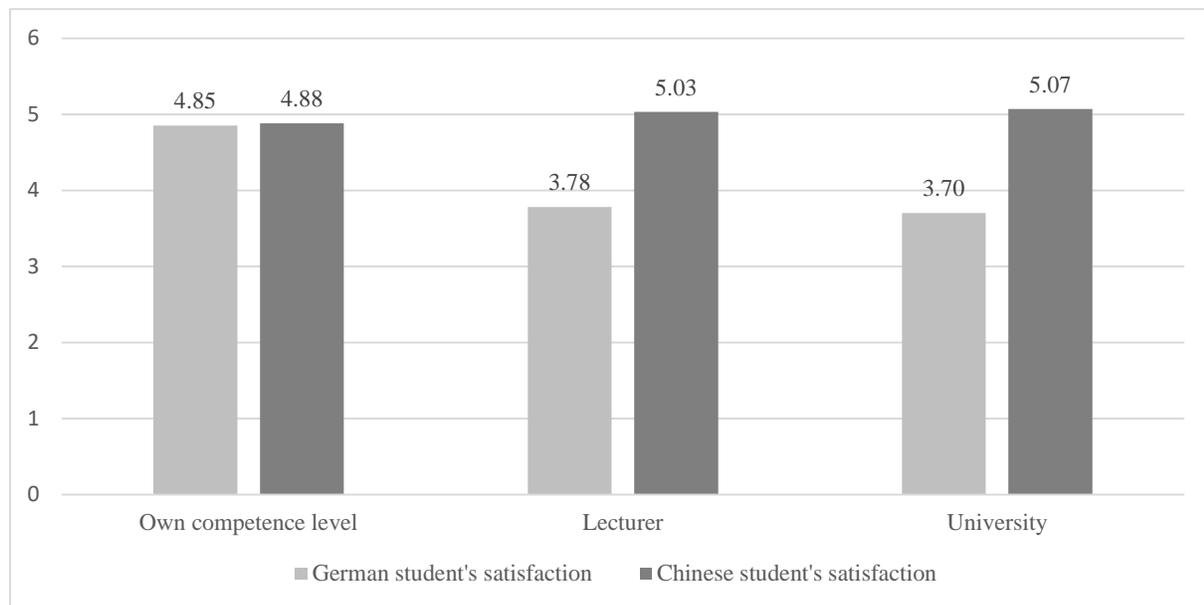
The results in figure 2 consist of different questions about student's satisfaction. The own satisfaction was prompt with one question about the own competence level when using technologies. The student's satisfaction with their lecturer was captured with two questions about the competence level of lecturers when using technologies and the degree to which lecturers use technologies to support the learning process. Additionally, student's satisfaction with university consists of five questions about the option of using technologies of your choice for studies / the project and communication, the scope of technologies available for studies/the project and communication, The availability of university support services as well as information technologies at the university, The reliability of technologies at the university/at the campus and the quality of the university IT service. *However, both groups are satisfied with their own competence level when using technologies, but the German students were less satisfied with the technical support than the Chinese students. Moreover, the competence level of the Chinese lectures received a better evaluation on average than the German teachers.* Not surprisingly, the

availability, the reliability and the quality of the technologies and the IT-support of the Chinese university performed on a higher level in contrast to Germany. The Chinese students evaluated new technologies better in comparison to German students as the study results indicate. By comparing the status-quo of the usage of new technology at the two universities the Chinese are always ahead in this field.

Table 4: Intercultural knowledge among both student groups

| Please indicate the degree to which the statements apply to you. | German students<br>(N= 133) |        | Chinese students<br>(N= 170) |        |
|--|-----------------------------|--------|------------------------------|--------|
|  | Mean                        | SD     | Mean                         | SD     |
| 1. I am open-minded to people from different cultures.           | 5,7218                      | 1,5243 | 5,5412                       | 1,3679 |
| 2. I enjoy interacting with people from different cultures.      | 5,5113                      | 1,5793 | 5,5353                       | 1,2600 |
| 3. I respect the values of people from different cultures.       | 5,7669                      | 1,4402 | 5,9353                       | 1,1571 |
| 4. I benefit from my intercultural knowledge.                    | 5,2406                      | 1,4727 | 5,5353                       | 1,2878 |
| 5. I like to learn more about other cultures.                    | 5,5038                      | 1,5649 | 5,8765                       | 1,2026 |
| 6. I respect the ways people from different cultures behave.     | 5,5038                      | 1,4176 | 5,9294                       | 1,1695 |

Figure 2: Students' satisfaction of own competence level as well as lecturer and university



*The next chapter focuses on the last research question. Regarding the assessment of the university image, the Chinese students had a better attitude towards their home university than the students in Germany. The image of the home university was measured with a semantic differential with 11 bipolar items being often used in higher education marketing surveys. Although, the students in Germany evaluated their university above the average with mean*

values over 4.4566. The mean values of the Chinese participants were around 5.5781. In a linear regression ( $r^2 = 0.397$ ) with different independent variables the impact of the support from university (standardized beta coefficient  $b = 0.293$ ,  $p > 0.001$ ) and the intercultural knowledge (standardized beta coefficient  $b = 0.196$ ,  $p > 0.001$ ) on the perceived university image was approved.

Table 5: Regression: Influences on the perception of the university image

| <b>Dependent variable: Perception of the University Image</b> | <b>Standardized Beta Coefficients</b> | <b>Significance</b> |
|---|---------------------------------------|---------------------|
| <b>Constant</b>   |                                       | >0,001              |
| <b>Germany instead of China</b>                               | -0,289                                | >0,001              |
| <b>Satisfaction with the support from lecturer</b>            | 0,076                                 | 0,263               |
| <b>Satisfaction with the support from university</b>          | 0,293                                 | >0,001              |
| <b>Socialization with media</b>                               | -0,003                                | 0,956               |
| <b>Intercultural knowledge</b>                                | 0,196                                 | >0,001              |
| <b>Age</b>  | 0,101                                 | 0,030               |
| <b>Female instead of Male</b>                                 | -0,027                                | 0,566               |
| N=203, $r^2=0.397$  |                                       |                     |

*Regarding these results, interesting similarities and differences were found between the two countries. In general, all students had a high acceptance and usage level of new technologies and access to modern technological equipment. Despite the Chinese participants evaluated a lot of tools and approaches better, the German students assessed these tools above the average. One reason for this could be that a lot of Chinese universities invested wisely in new technology in the classroom and focus now on more advanced educational systems. German universities are partly a bit behind. Thus, the Chinese students appreciate this and give their home university a better evaluation. Additionally, many Chinese professors begun to use various modern educational technologies in the classroom, and e-learning is being implemented in a variety of ways. New technology applied in school administrative work is developing much faster than that in teaching, which is probably because of the particular academic environment and culture in universities. To encourage professors to apply e-learning more actively, new measures and new mechanisms need to be established in higher educational institutions. Computers and campus networks have become essential in the Chinese students' studying lives. In other words, students are becoming the key driving force to the development of new technology in higher education. [27]. Also in Europe, young adults seem to be extensive internet users and innovative approaches, e.g. mobile learning, become very popular. Even if most students did not have much experiences with technology-assisted education, they agreed on several benefits of mobile learning as empirical studies confirmed [1]. However, the usage of new technologies and modern*

approaches play a significant role in the (future) educational sector [4]. Moreover, the organizational structures and processes at German universities become more flexible and more open to new technological approaches and educational systems. For instance, the German Baden-Wuerttemberg Cooperative State University started different programs to increase the technical competence level of their teachers according to the TPACK model. Additionally, an education support centre will be implemented for the effective use of digital media and technological tools for students and teachers in daily university life soon. Moreover, the experience exchange between German and Chinese professors concerning new technology in the classroom is promoted by various initiatives at the German Baden-Wuerttemberg Cooperative State University. *The last chapter will concentrate on which recommendations can be derived for the academic world with respect to learning and teaching.*

### **Discussion, Conclusions and Outlook**

Current study results shed a positive light on the integration of new technologies in higher education, but also identify many limitations as well as potential for improvement [1]. Students expect professors to use a variety of digital technologies in classroom and to integrate them into the teaching and learning environments. So far, there is no policy regarding the implementation of digital tools into teaching at the university, and all professors approach their teaching with their own perspectives and preferences. Therefore, it is important to manage the expectations of students, professors and universities to enable an effective use of technology in education [9]. Overall, the empirical findings showed that China has a slightly better digital infrastructure, improved awareness of using new technology and innovative learning approaches in the context of higher education.

*In general, it requires strongly motivated students and lecturers to use innovative methods and digital tools on the long run. Furthermore, modern technical equipment and infrastructure must be available and a reliable and continuous support should be given.*

*The presented study results are limited because only a medium-sized sample was used and only two countries participated.* Nevertheless, these empirical findings give deeper insights into this new field and help to derive concrete recommendations for universities, faculties and the academic staff. To get an insight into learning with new technologies in this study, the students' perspective was investigated. *In future surveys, also the teachers' side should be explored to receive a better understanding of both worlds.* Established approaches – like TPACK – give teachers guidelines, to use technology individually [12]. Moreover, the sample size must be increased and the study design extended (e.g. selective qualitative interviews with students to gain more details).

*Additionally, the study could to be conducted in more countries, e.g. in Australia, Middle East or other parts of Europe, to generate a broader view of the impact and usage of new technologies and innovative concepts in higher education across the globe. Nevertheless, new tools and approaches must always be adapted to cultural and country-specific requirements and needs of the different participants and universities types.* With respect to the digital divide and the culture of the different countries specific recommendations should be given [25; 26; 24].

## References

1. Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., Ananthanarayanan, V. (2017). “New Media Consortium Horizon Report – 2017 Higher Education Edition”, Online: <http://www.nmc.org/publication/nmc-horizon-report-2017-higher-education-edition/>.
2. Arbaugh J.B., Rau, B.L. (2007). “A Study of Disciplinary, Structural, and Behavioral Effects on Course Outcomes in Online MBA Courses”, *Decision Science Journal of Innovative Education*, Vol. 5, No. 1, pp: 65-95.
3. Barret, M., Byram, M., Lázár, I., Mompoin-Gaillard, P., Philippou, S. (2013). “Developing Intercultural Competence through Education”, Online: <https://www.coe.int/t/dg4/education/pestalozzi/Source/Documentation/Pestalozzi3.pdf>.
4. Biloš, A., Turkalj, D., Kelić, I. (2017). “Mobile Learning Usage and Preferences of Vocational Secondary School Students: The cases of Austria, the Czech Republic, and Germany”, *Our Economy*, 63(1), 59–69. doi: 10.1515/ngoe-2017-0006.
5. Brooks, D.C., Pomerantz, J. (2017). “*ECAR Study of Undergraduate Students and Information Technology, 2017*”. Research report. Louisville, CO: ECAR.
6. Bull, G., Thompson, A. D., Schmidt-Crawford, D., Garofalo, J., Hodges, C. D., Spector, J. M., Ferdig, R. E., Edyburn, D., Kinshuk (2016). “Evaluating the Impact of Educational Technology”, *Journal of Digital Learning in Teacher Education*, Vol. 32, No. 4, pp: 117-118.
7. Chee, K.N., Yahaya, N., Ibrahim, N.H, Noor, M. (2017). “Review of Mobile Learning Trends 2010-2015: A Meta-Analysis”, *Journal of Educational Technology & Society*, Vol. 20, No. 2, pp: 113-126:
8. Creswell, J.W. (2014). “Research Design. Qualitative, Quantitative and Mixed Methods Approaches (4th edition)”. London: SAGE.
9. Gabriel, M., Campbell, B., Wiebe, S., MacDonald, R., McAuley, A. (2012). “The Role of Digital Technologies in Learning: Expectations of First Year University Students”, *Canadian Journal of Learning and Technology*, Vol. 38, No. 1, pp: 1-18. doi:<http://dx.doi.org/10.21432/T2ZW2D>
10. Ifenthaler, D. (2015). “Learning Analytics”. In J. M. Spector (ed.), *The SAGE encyclopedia of educational Technology*, Vol. 2, pp: 447–451.
11. Koehler, M.J., Mishra, P. (2009). “What is Technological Pedagogical Content Knowledge?”, *Contemporary Issues in Technology and Teacher Education*, Vol. 9, No. 1, pp: 60-70.
12. Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., Graham, C. R. (2013). “The Technological Pedagogical Content Knowledge Framework”. In J.M. Spector et al. (eds.), *Handbook of Research on Educational Communications and Technology*, Springer Science and Business, Media New York.
13. Kuhnel, M., Seiler, S., Honal, A., Ifenthaler, D. (2017). “Mobile Learning Analytics in Higher Education: Usability Testing and Evaluation of an App Prototype”. Paper presented at CELDA International Conference, Vilamoura, Algave, Portugal, October 2017.

14. Lai, D., Mao, C. (2014). "A Study on Factors Affecting the Mobile Learning of Undergraduate Students in China", *Creative Education*, Vol. 5, pp: 372-375.
15. Li, J. Li, S., Li, Y. (2016) "English Learning on the Move: A Survey and Study of Mobile App Assisted English Learning in Chinese Tertiary Education", *The 11th International Conference on Computer Science & Education (ICCSE)*, Nagoya, 2016, pp. 767-771. doi: 10.1109/ICCSE.2016.7581678
16. Marambe, K.N., Vermunt, J.D., Boshuizen, H.P.A. (2012). "A Cross-Cultural Comparison of Student Learning Patterns in Higher Education", *Higher Education*, Vol. 64, No. 3, pp: 299-316. doi: 10.1007/s10734-011-9494-z
17. Mtebe, J. S. (2015). "Learning Management System Success: Increasing Learning Management System Usage in Higher Education in Sub-Saharan Africa", *International Journal of Education and Development Using Information and Communication Technology*, Vol. 11, No. 2, pp: 51-64.
18. OECD (2009). *OECD Reviews of Tertiary Education, China*, OECD, Paris.
19. OECD (2014). *Education at a Glance 2014, Germany*, OECD, Paris.
20. Peine, A., Kabino, K., & Spreckelsen, C. (2016). „Self-directed learning can outperform direct instruction in the course of a modern German medical curriculum - results of a mixed methods trial”, *BMC Medical Education*, Vol. 16, No. 158, pp: 1-11. <http://doi.org/10.1186/s12909-016-0679-0>
21. Pimmer, C., Mateescu, M., Gröhbiel, U. (2016). "Mobile and Ubiquitous Learning in Higher Education Settings – A Systematic Review of Empirical Studies", *Computers in Human Behavior*, Vol. 63, pp: 490-501.
22. Schulte, S., Richter, T., Grantz, T. (2014). "Digital Media as Support for Technical Vocational Training: Expectations and Research Results of the Use of Web2.0", *International Journal of Advanced Corporate Learning*, Vol. 7, No. 3, pp: 29-32.
23. Siemens, G. (2013). "Learning Analytics: The Emergence of a Discipline", *American Behavioral Scientist*, Vol. 57, No. 10, pp: 1380-1400.
24. Von Egmond, M.C., Kühnen, U., Li, J. (2013). „Mind and Virtue: The Meaning of Learning, a Matter of Culture?", *Learning, Culture and Social Interaction*, Vol. 2, No. 3, pp: 208-216. doi: <https://doi.org/10.1016/j.lcsi.2013.06.002>.
25. Windham, C. (2005). "The Student's Perspective". In: Oblinger, D. G. and Oblinger J. L. (editor). *Educating the Net Generation*. (Chapter 5). Online: <https://www.educause.edu/ir/library/pdf/pub7101e.pdf>.
26. Zhang, J. (2007). "A Cultural Look at Information and Communication Technologies in Eastern education", *Educational Technology Research and Development*, Vol. 55, No. 3, pp: 301-314.
27. Zhao, G., Jiang, Z. (2010). "From E-Campus to E-Learning: An Overview of ICT Applications in Chinese higher education", *British Journal of Educational Technology*, Vol. 41, No. 4, pp: 574-581. doi:10.1111/j.1467-8535.2010.01085.x