CDTM LMU TUM
CENTER for DIGITAL TECHNOLOGY & MANAGEMENT

THE FUTURE OF EDUCATION
TREND REPORT 2015

Kindly supported by the Joachim Herz Stiftung

The Joachim Herz Stiftung fosters education, science and research in the Natural Sciences and Business Sciences, as well as the personal development of adolescents and young adults.

Within the "Perlenfonds", the Joachim Herz Stiftung also supports selected projects of non-profit third parties, which sustain the core themes of the project work of the Joachim Herz Stiftung.

The Trend Seminar was one of the projects selected and supported by the Joachim Herz Stiftung.

A project of the Center for Digital Technology and Management (CDTM)

The Center for Digital Technology and Management (CDTM) is a joint, interdisciplinary institution for education, research and entrepreneurship of the Ludwig-Maximilians-Universität (LMU) and the Technische Universität München (TUM).

It offers the add-on study program „Technology Management" for students from various backgrounds, which provides students with tools and knowledge at the intersection of business and digital technologies.

The entire trend report was written by CDTM students under the close guidance of research assistants in 2015.

For more information about the CDTM and its related projects, please visit http://www.cdtm.de

The Future of Education

ISBN: 978-3-9815538-7-1

Preface of the Editors

As the statement by Herman Kahn, one of the founding fathers of modern scenario planning, nicely states, it is tremendously important for strategy and policy makers to get a deep understanding of possible future developments in order to be prepared for them.

At the Center for Digital Technology and Management (CDTM), our aim is to develop innovators of the future. It is our mission to equip our students with the tools and knowledge they will need in order to become responsible leaders in their future careers that shape rather than react to the environment.

This trend report is the result of a course within the inter-disciplinary add-on study program in Technology Management at CDTM, called the Trend Seminar. 20 to 25 selected students of various disciplines, such as Business Administration, Economics, Computer Science or Electrical Engineering work together on a relevant topic related to ICT.

> **“Everybody can learn from the past. Today it is important to learn from the future.”**
>
> Herman Kahn

Over seven intense weeks, fulltime, the participating students dive deeply into the topic of the Trend Seminar. Thereby, they work in interdisciplinary subteams, applying the knowledge they bring along from their main studies and extending it by extensive research. They conduct trend research, develop scenarios of the future, generate ideas for innovative products or services and detail them out to concrete business concepts.

We would like to take the chance to thank everyone who contributed and made this CDTM Trend Report possible: We want to thank the Joachim-Herz-Stiftung who were highly interested in the interdisciplinary trend seminar course format as well as in the topic which is at a core topic of the Joachim Herz Stiftung and hence decided to support our project.

In addition, we very much thank all our lecturers that shared their knowledge and contributed to this project’s success:

Patrick Christ (CDTM)
Michael Chromik (CDTM)
Dr. Frank Danzinger (Fraunhofer IIS)
Prof. Dr. Klaus Diepold (TUM)
Michael Folgmann (TUM)
Jutta Frieden (Maths Doctor)
Matthias Kessler (IICM)
Stefan Langer (CDTM)
Alexander Machado (CDTM)
Ann-Kathrin Pehmer (TUM)
Hanneke Riedijk (Personal Coach)
Alexander Preißner (CDTM)
Ludwig Preller (Clevis)
Jonas Rieke (CDTM)
Dr. Hartwig Ruell (Strategist)
Florian Schmieg (BCG)
Andreas Schrems (Personal Coach)
Dr. Fabian Uhrich (Zooplus AG)
Dr. Felix von Held (IICM)
Dr. Felix Werle (IICM)

Finally, we want to say special thanks to the CDTM students of the class of Spring 2015. They put great energy and enthusiasm into this project, which made it a pleasure for us to supervise the course and coach the individual teams.

The Future of Education

Education is undergoing radical changes. While education used to be mainly frontally held lectures, digital technologies today allow for a wide range of new possibilities. This not only affects education in schools or universities, but also executive education and trainings – lifelong learning is crucial in today's business world.

Ted Talks, MOOCs with thousands of enrolled students as well as online tutoring platforms radically change the way education is taking place. With the possibility for everyone to select from a wide range of pre-selected online lectures, teachers are increasingly taking on the role of coaches rather than the one of traditional lecturers. Numerous private providers of education products enter the market and private individuals share their knowledge without pursuing commercial interests. Accordingly, the future role of traditional educational institutions is uncertain. Will new education providers take over or will traditional educational institutions keep their position? Does the working world of the future favor alternative ways of education or will the importance of traditional degrees persist?

Digitization clearly affects the concepts of traditional education as well. Digitally enhanced teaching and lecturing concepts arise, new formats such as "flipped classroom" are experimented with and physical lectures are complemented with online learning. What will the school and the university of the future look like?

Access to education is another interesting aspect to consider. Technology allows extending the access to education for very low cost. People previously excluded from high-class education are gaining access and can benefit from online resources. Will education be available for lower cost and in regions with poor educational infrastructure or will online resources be restricted to a selected circle of users in the long run?

Given the impact of education on society and considering recent developments and open questions, the importance of shedding some light on the future of education becomes obvious. This can be done by addressing three key questions:

What are recent developments and key trends that shape the future of education? What could the educational world look like in the future? What are new educational products and services that can be introduced in the future, both in a commercial or non-profit context?

The three sections of this report address these questions. We are looking forward to witness the changes in education and to see one or the other idea developed within this report implemented.

Veronika Gamper and Stefan Nothelfer
Center for Digital Technology and Management

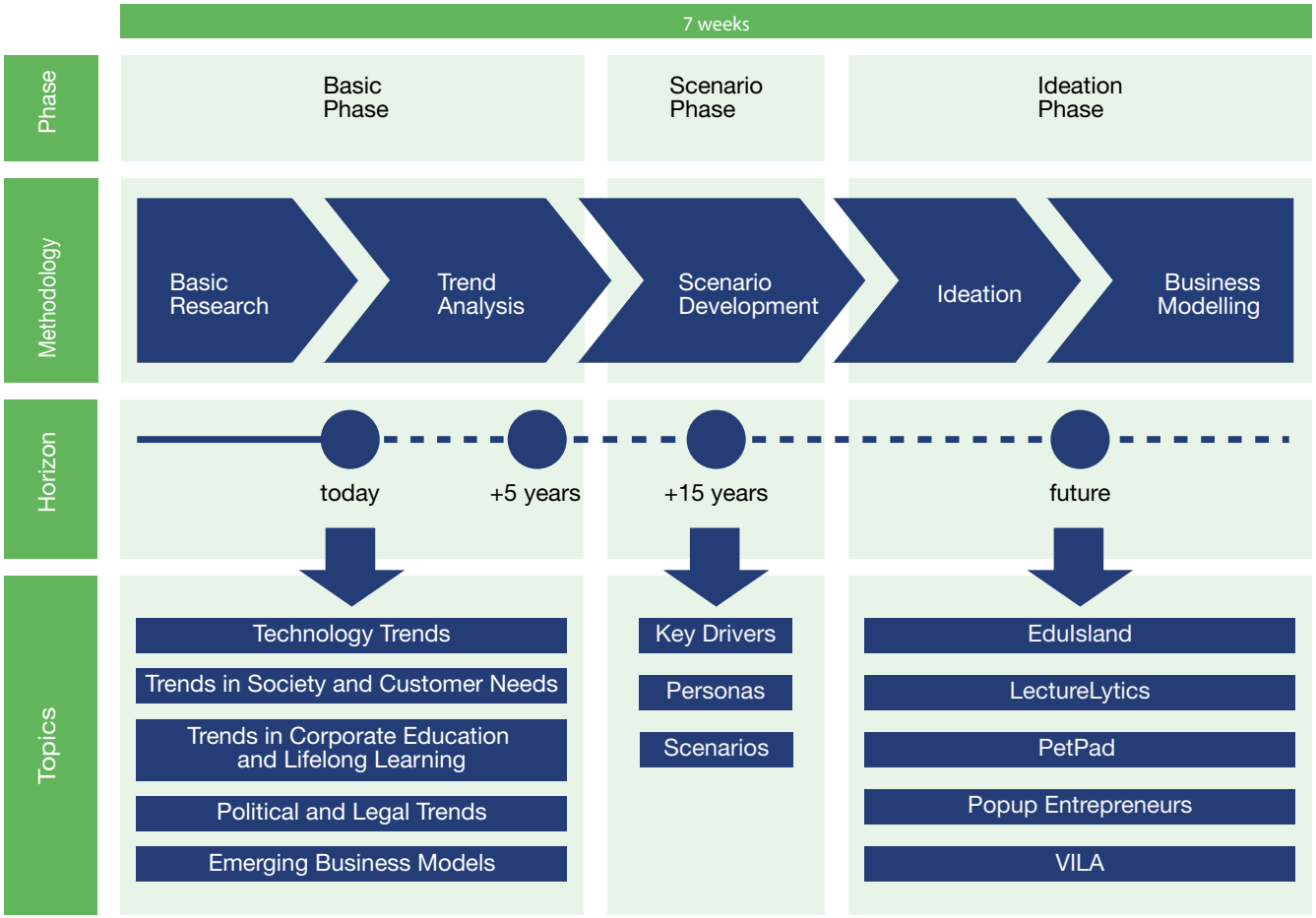
Table of Contents

Methodology

For a given topic that is highly impacted by digital technologies, the Trend Seminar pursues three main goals:

- To analyze the status quo, recent developments and to identify important trends
- To develop extreme scenarios of the future, in order to be prepared for upcoming challenges
- To develop future-proof product and service ideas and detail them out into business concepts

These goals are represented by the three phases of the trend seminar, the Basic Phase, the Scenario Phase and the Ideation Phase. 25 students, supervised by two doctoral candidates, pursue the Trend Seminar in seven weeks of intensive full-time work. In each phase, interdisciplinary subteams are formed including students from technology and business backgrounds.



The **Basic Phase** yields a holistic overview on recent developments and trends in the environment of the overall topic. Based on the commonly used STEP approach, the status quo and trends in the fields society & customer needs, technology, corporate education & lifelong learning, politics & law, as well as emergin business models are analyzed. Knowledge is gathered by literature research, preceded by a series of input presentations by experts on the topic.

The class is split into five teams, each working on one of the thematic scopes. At the end of the Basic Phase, teams present their key findings to each other in order for everyone to get a holistic view on the topic to build upon in the following phases.

The **Scenario Phase** builds upon the analyzed trends in order to create four extreme scenarios of different futures in fifteen years ahead. Driving forces behind developments are identified and specified as drivers with bipolar extreme outcomes. Once specified, all drivers are ranked according to their respective impact on the overall topic and the perceived degree of uncertainty regarding their outcome. Two key drivers that are independent from each other and have both a high impact and a high degree of uncertainty are chosen and, with their bipolar outcomes, span a scenario matrix of four extreme scenarios. A timeline for each of the scenarios is created and the scenarios are sketched out using personae descriptions and visualizations.

The Scenario Phase starts with a two-day workshop followed by group work in four teams. Teams are newly formed in order to include experts from each subtopic of the Basic Phase in each new Scenario Team.

In the third phase, the **Ideation Phase**, the goal is to develop innovative business and educational concepts, which are then tested against the previously developed scenarios. Within a two-day workshop on structured ideation following the SIT approach, a large number of business ideas are developed.
Out of these, the most promising five ideas are selected and further developed into detailed business concepts. The business model canvas by Alexander Osterwalder and Yves Pigneur serves as base structure.

At the end of the seminar, the business model concepts are presented to the project
partner and guests.

Trends

The following chapter lists currently observable trends with a strong impact on the future of education. In accordance with the Basic Phase methodology, trends and related driving forces are structured in five areas: technology; society & customer needs; corporate education & lifelong learning; politics & law; emerging business models.

An exhaustive description can be found in the Chapter Methodology.

Technology Trends in Education

Human-Computer Interaction

M-Learning

Big Data

Augmented Reality

Digital Teaching Platforms

Massive Open Online Courses

Behavior Pattern Recognition in Machine Learning

3D Printers

Technology Trends in Education

Since the emergence of the electric computer, technology has played a crucial part in the development of new trends. As of 2015, with widely available broadband internet and established app stores for all kinds of devices, technological progress marches on. Also, modern technology has carved its way through education and classrooms all over the world. While overhead projectors and chalkboards have been state of the art for decades, today teachers are increasingly employing more technologically advanced education materials - education landscape as we know it upside down.

For one, the interaction between humans and computers is radically changing, such that there are ever more direct ways of interacting with our high-tech devices. In general, this leads to the inclusion of a bigger portion of the population in digital education. Increasingly simple ways to operate devices enable non-tech-savvy user groups such as children and the elderly to access digital education content. Furthermore, voice recognition and haptic feedback enable blind people to interact with digital devices.

On mobile devices and smartphones in particular, learning applications are also becoming more popular. These apps engage the learner to work in tiny sprints on commutes or other short time frames. The umbrella-term “m-learning” also includes any other mobile exposure to learning content.

On top of m-learning, teaching platforms are enabling teachers to make use of students’ personal mobile devices in classrooms. The resulting interconnectivity within the classroom enables teachers to directly observe the progress of individual students and enables students to give direct feedback during class.

Learning is a highly personal activity. Big data analysis helps realize this by processing individual students’ progress, talents and needs. Acquired knowledge can then, for example, be applied to emphasize topics students struggle with and improve teaching material. As computers get better at recognizing these behavioral patterns, complex mental tasks such as individual task assignment, grading and creation of new content could soon be automatized.

The industry and public are currently expecting a massive impact of 3D-printers in the coming years. While it is slowly becoming available to a mass market, 3D-printing is opening up new fields of learning via prototyping and encourages a new level of engagement and curiosity amongst students.
With the Microsoft HoloLens and massive Augmented Reality (AR) investments by Google, mobile AR devices might become commonplace in future classrooms. Their interactive visualization features make them especially interesting for gamification.

Furthermore, Massive Open Online Courses (MOOCs) with often many thousands of learners from all over the world offer free online lectures through the internet. They provide peer-to-peer interaction via social platforms and their popularity has greatly increased since 2011.
The following section will explain all the aforementioned trends in detail and point out their influence on the future of education.

Human-Computer Interaction

Beyond Keyboard and Display

Mouse clicks, touchscreens and voice recognition are examples of interactions between human beings and computers. With the emergence of smartphones, HCI has put an emphasis on touchscreens, so that they can now also be found in tablets and notebooks. Furthermore, wearable devices like the Apple Watch or Google Glass use original ways to communicate with the user. Speech recognition and novice haptic elements are used in these devices, designed to take the user experience to new levels of usability. Similarly new display technologies are entering the mainstream markets, such as heads-up displays (HUD) in vehicles that reduce the distraction of the driver while using the navigation system. [1] The increasing number of sensors in all kinds of digital equipment might contribute to new interactions via gestures, speech or even vital signals (for example as evident in the Apple Watch). [2] Those HCI paradigms might knit in our everyday behavior ever more seamlessly and thus eventually create a symbiosis of the digital and analog worlds. [3]

Facts

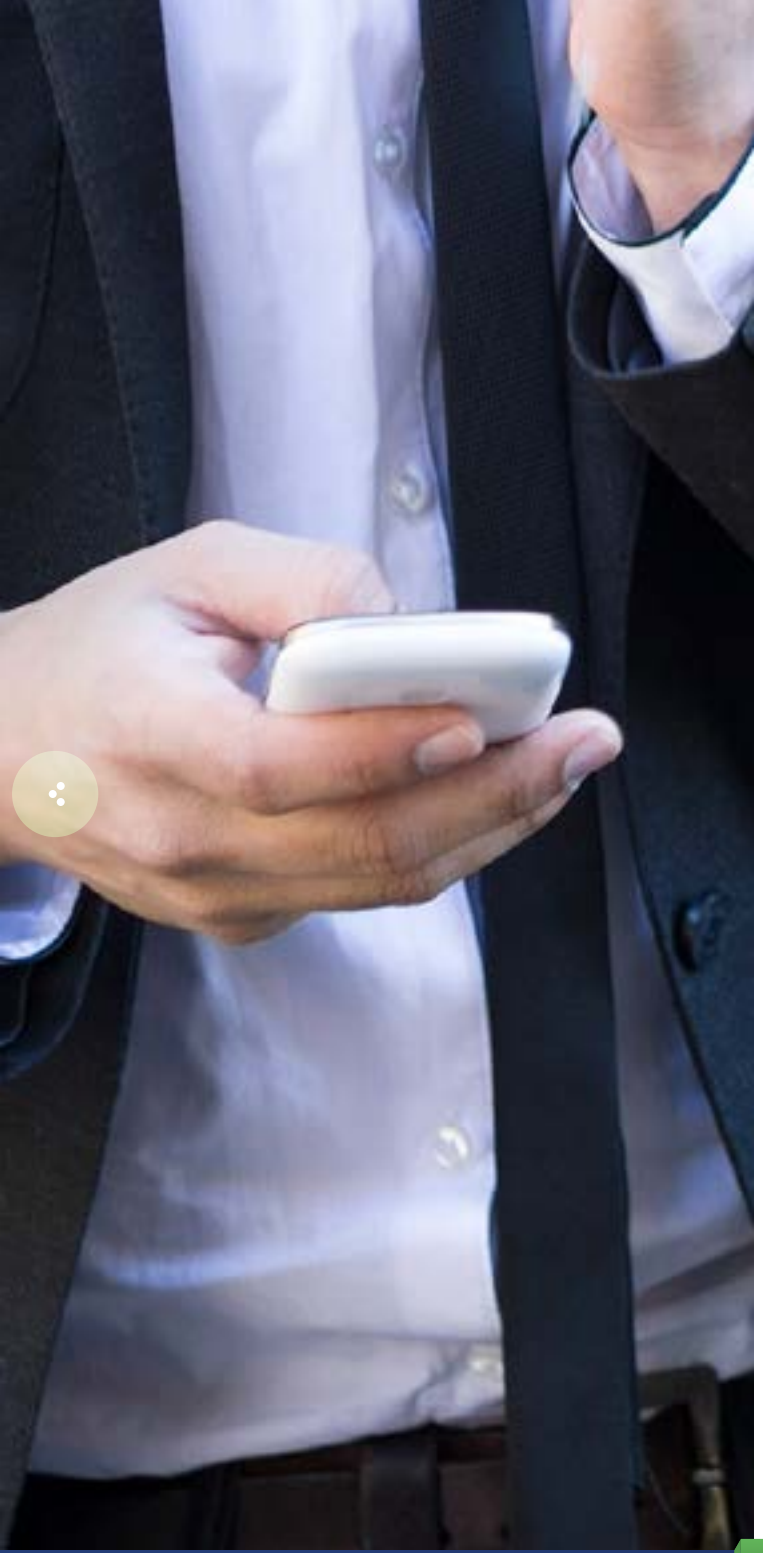
- Joint discipline of psychology, design and information science
- HCI acts as the communication channel between man and machine
- Strong focus on Graphical User Interface (GUI) on desktop computing
- Development accelerated due to the social creation of interfaces (social computing) [4]
- Increasing e-learning market size due to inclusion of new user groups with better HMI technologies

Key Drivers

- Improved speech recognition (e.g. Apple Siri, OK Google)
- Improved display technology (e.g. Google Glass, Oculus Rift)
- Innovative interaction concepts (e.g. Apple Watch, Pebble Time)

Impact on the Future of Education

A general trend of increased user-friendliness can be observed. This leads to a better inclusion of new user groups such as children, the elderly and the disabled. Thus, an increasing amount of e-learning content addressing these groups will probably be produced in the coming years. Learning will become more supportive of the human nature and more tailored to the capabilities of the human mind. GUIs will probably become even more intuitive, which would enable smaller children and older people to access digital content more easily and benefit from novel educational technology. In connection with advancements in speech, text and gesture recognition, future students might interact with computers similar to the way they would interact with teachers. Since interacting with augmented reality is already possible today, interaction with computer-generated content in our real environment is a likely development within the coming years.



M-Learning

Using the smartphone to learn on the go

Smartphones and tablet computers have been part of our daily lives for only a decade now. However, as many as 78% of teenagers have cell phones and almost the same number of teens have access to internet on cell phones. [5] Also, global mobile data traffic has increased significantly. [6] Offering digital textbooks is as common as the countless learning apps in the app stores from Apple and Google. [7] Commuters in the UK spend an average of 56 minutes per day travelling. [6] Most students have access to education apps supporting self-paced learning using their mobile devices on the go. They can access content on-demand. Furthermore, "Mobile" - Learning allows people to access educational content in interactive and exciting ways. A perfect example is "Duolingo" [8], a language-teaching platform utilizing gamification and social aspects, that allows students to learn the basics of several languages in short bursts. Indeed, current applications already provide creative ways to organize and deliver education content and will continue to do so in the future.

Facts

- Often online systems in the background [9]
- More than 80,000 apps available in the Apple app store by spring 2015 (Apple)
- One in four people in the EU used mobile internet in 2013 [5]
- Mobile learning helps students to use travelling time effectively by learning for exams [10]

Key Drivers

- Increasing share of mobile data usage on the internet
- Venture capitalist interest in mobile learning start-ups
- Increasing technology maturity
- Adaption of users to content presented on mobile devices [11]
- New forms of mobile electronics (smart watches)

Impact on the Future of Education

Through the combination of multiple media channels, it is possible to improve the learning experience. [12] Similarly, collaborative and social traits can connect the learner to the content and thereby also improve the learning experience. In a modern culture of continuous exposure to visual and acoustic stimuli, m-learning creates a way to interact with the content of knowledge at a permanent and frequent basis. In the near future, the interconnection of different devices (e.g. wearables) will increase the range of possibilities – such as seamless multi-device applications. All in all, learners will be less constrained to their classical learning environments.

Big Data

Analyzing large amounts of data yields profitable knowledge about users and processes

Big Data is a technological trend that arises from the exponentially growing amount of data gathered by digital devices. Due to technological advances, an increasing amount of data can now be processed. Big data allows for processes to be optimized by analyzing data in order to find useful coherences and make predictions about risks, customer behavior, and pricing. [13] Revenue generated by big data solutions have shown annual growth rates over 50% from 2011 to 2013, and further growth is predicted for the upcoming years. [14] However, previous expectations of big data appear to have been overinflated and the effective utilization of big data by smaller businesses has yet to be realized. [15] [16] Nevertheless, major companies such as Amazon and Google already utilize big data in a very efficient manner. [17] German Information and communications technology (ICT) companies see big data as one of the most important technology trends in 2015. [18] It is expected to grow, as companies make larger investments in the technology and generate higher revenues. [19] Educators also see an important role of Big Data, which has led to new courses such as "Big Data in Education" in 2013. [20]

Facts

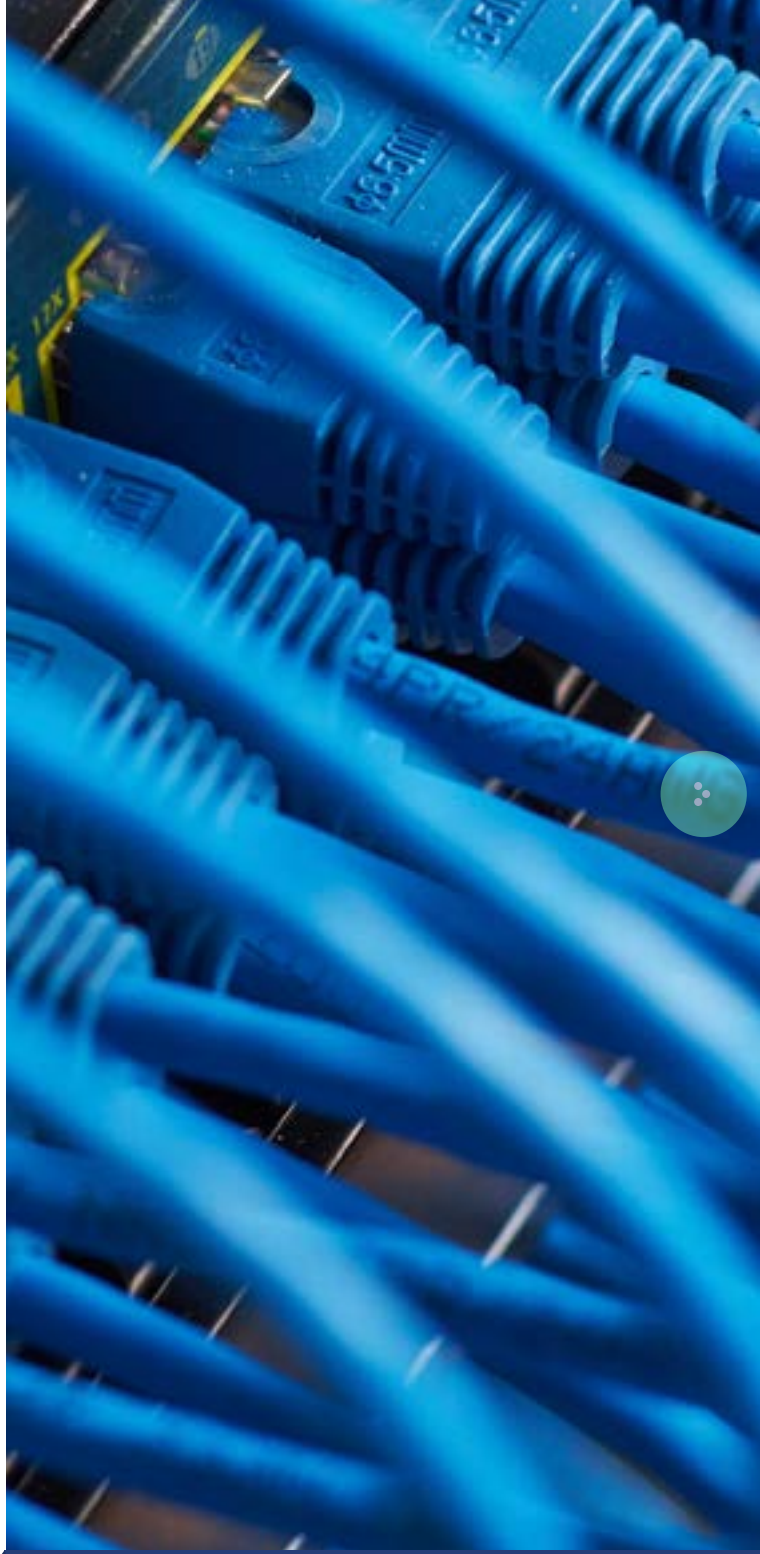
- Big data is often used as a synonym for general data analytics
- Financial service companies are the major investors in big data [19]
- There are privacy issues connected to saving and analyzing personal user data
- Intelligence agencies already utilize big data [21]
- Usage of Big Data in education is still in the early stages
- Educational institutions emphasize Big Data analysis as an important skill
- Big data is becoming corporate mainstream [22]

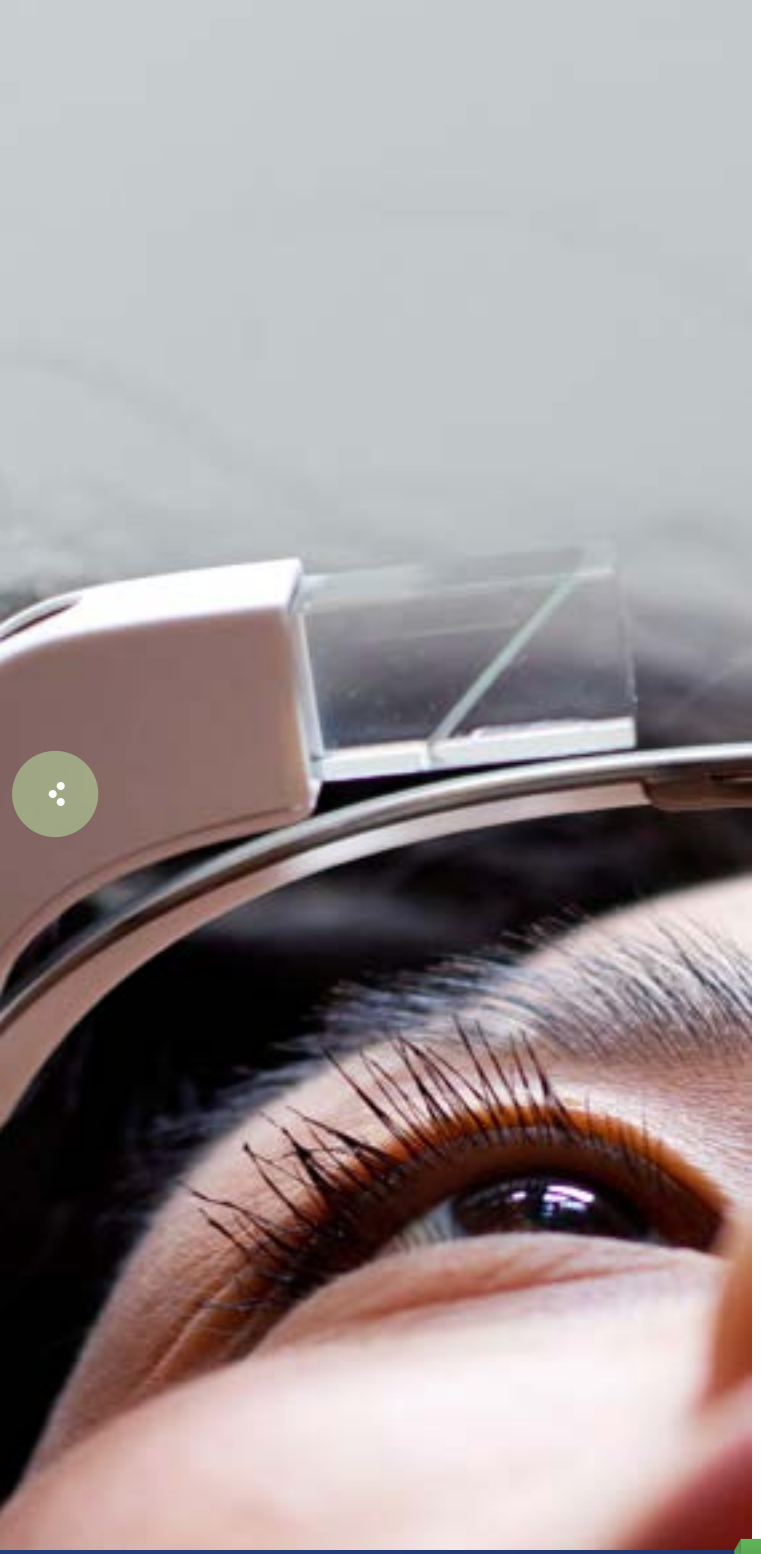
Key Drivers

- Government facilities and companies recognize positive benefits of Big Data analysis and want to pursue the technology further [13]
- Mobile technology, social media, and the internet of things accelerate the growth of to the amount of information [23]
- Growing computational power enables more thorough analysis approaches
- Rising need for Big Data solutions as conventional database tools have difficulty handling massively growing data [13]

Impact on the Future of Education

In the coming years, big data and data analysis will probably be relevant for both public and private educational providers. Educational providers could analyze student performance and its correlation with material, teachers, and the curriculum. The derived information could be used to improve materials, assess teachers, and emphasize problematic topics. Improved student performance and increased graduation rates could be positive benefits. Big data will most likely accompany other educational trends, such as m-learning or MOOCs, and become gradually more relevant as an ever-increasing amount of data is generated by these technologies. By analyzing generated data such as page views, clickstreams and individual results, big data could help estimate the effectiveness of new technologies to be incorporated in curricula.





Augmented Reality

Adding artificial, computer generated objects to real world perception

Augmented Reality (AR) adds artificial, computer generated objects to our perception of the real world and lets us interact with these objects. This way, users are presented useful information in a very intuitive way. The usage of mobile devices such as smartphones, tablets and wearables is the current driving factor of the technology. [24] After the first AR apps for smart phones appeared in 2008, the revenue was estimated to grow from less than $1 million in 2009 to $732 million in 2014. [25] The actual market size of 60 million regular users in 2013 is expected to grow to 200 million in 2018. [26] For the coming year significant revenue growth is expected ($180 million in 2014 to $1.2 billion in 2015). [27] An influential technology that channeled investors' hopes is Google Glass, which was released for beta testing in 2013. [28] The public sale of the product was stopped in early 2015, as according to Google, quality and performance goals could not be reached [29] However, Google still invests heavily in mobile AR technology and Microsoft entered the market with its own prototype in January 2015. [30] [31] Various apps for education environments have already been designed but could not reach a large audience yet. [32]

Facts

- Expected to hit a peak hype level in 2016 [33]
- As of 2015, the technology is restricted by high hardware requirements [34]
- Potential data protection issues due to permanent sensor activity (e.g. Google Glass) [35]
- High cost of many devices [36]
- Potential to reach the mainstream market within the next 5 years [37]
- The technology primarily utilizes mobile devices as they are already used by most students and teachers in Europe
- Growing gaming, Lifestyle and Health markets, which contribute the highest revenues [38]

Key Drivers

- High number of applications in many industries and everyday life [36]
- Improving quality and increasing number of apps makes AR attractive [38]
- Technology hype makes funding easy

Impact on the Future of Education

Estimations for the spread of mobile AR predict a very promising development, but might be overhyped. Past surveys have shown that AR applications are usually used for interactive content, such as gaming, instead of just displaying information. [24] Gaming is one of the driving factors of mobile AR and educational content has already been developed [39]. Therefore, AR is likely to be used to offer students and professionals interactive educative content utilizing Gamification concepts that can actively utilize a student's environment. In past years, new display technology in schools has mostly been used to change the way of presenting content. In the coming years, this trend is likely to continue with mobile AR offering 3D images of educational content and information that accompany books.

Digital Teaching Platforms

Using technology platforms to enhance In-class Learning

Digital teaching platforms are a series of technology products allowing technology intensive learning environments in teacher-centric classes. [40] The platforms improve classroom and curriculum management, real time student assessment and student-teacher interaction. Where schools are not able to provide technology devices, The Bring-Your-Own-Device (BYOD) concept offers cost effective, societal solutions to schools and universities that look to increase student interaction and collaboration inside the classroom. [41] As students often turn towards social websites during classes, digital teaching platforms allow teachers to manage classrooms better by controlling content, pushing quizzes, creating polls and chat walls, and monitoring student performance via learning analytics while putting restrictions on unwanted web access and social apps. [41] These tools allow teachers to identify struggling and disengaged students. Moreover, teachers can deliver series of learning material consisting of applets, multimedia, group exercises and quizzes. [40] Currently, a tool such as Google Classroom allows teachers to organize classroom assignments and provide real time one-to-one feedback to students. [42] This way, effective lessons and an optimum class environment can be created.

Facts

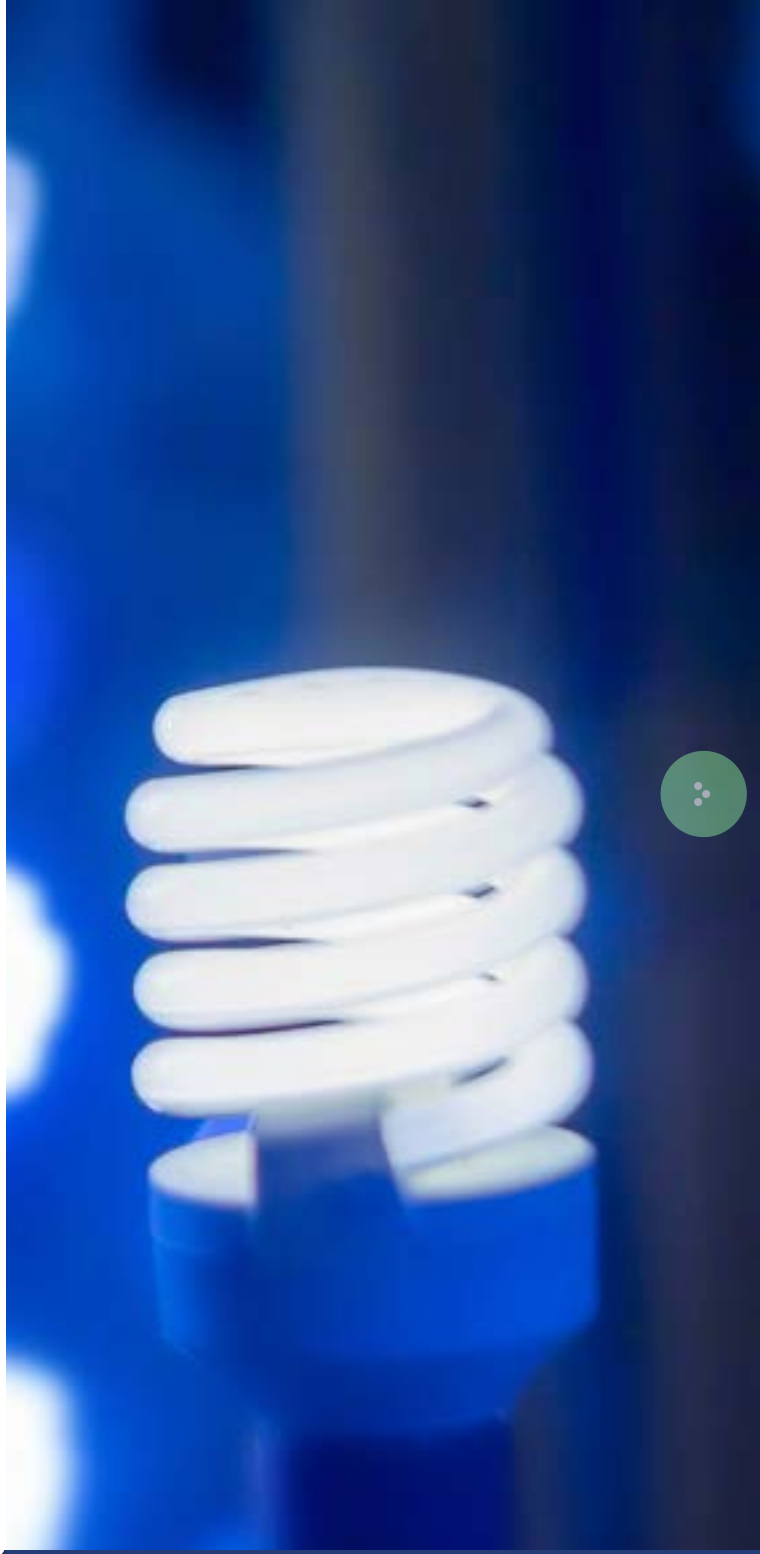
- Universities allow hassle free internet access to common networks such as eduroam [43] for all personal devices
- 78% of teens have a cell phone, 93% have a computer [44]
- 15 million people in 25 countries use “BRIGHTSPACE”, one of the popular digital learning platforms [41]
- Challengess
- Increasing transmission load and security risks due to more devices in local networks
- Technology usage policies required [41]
- Applications may not run on all platforms [41]

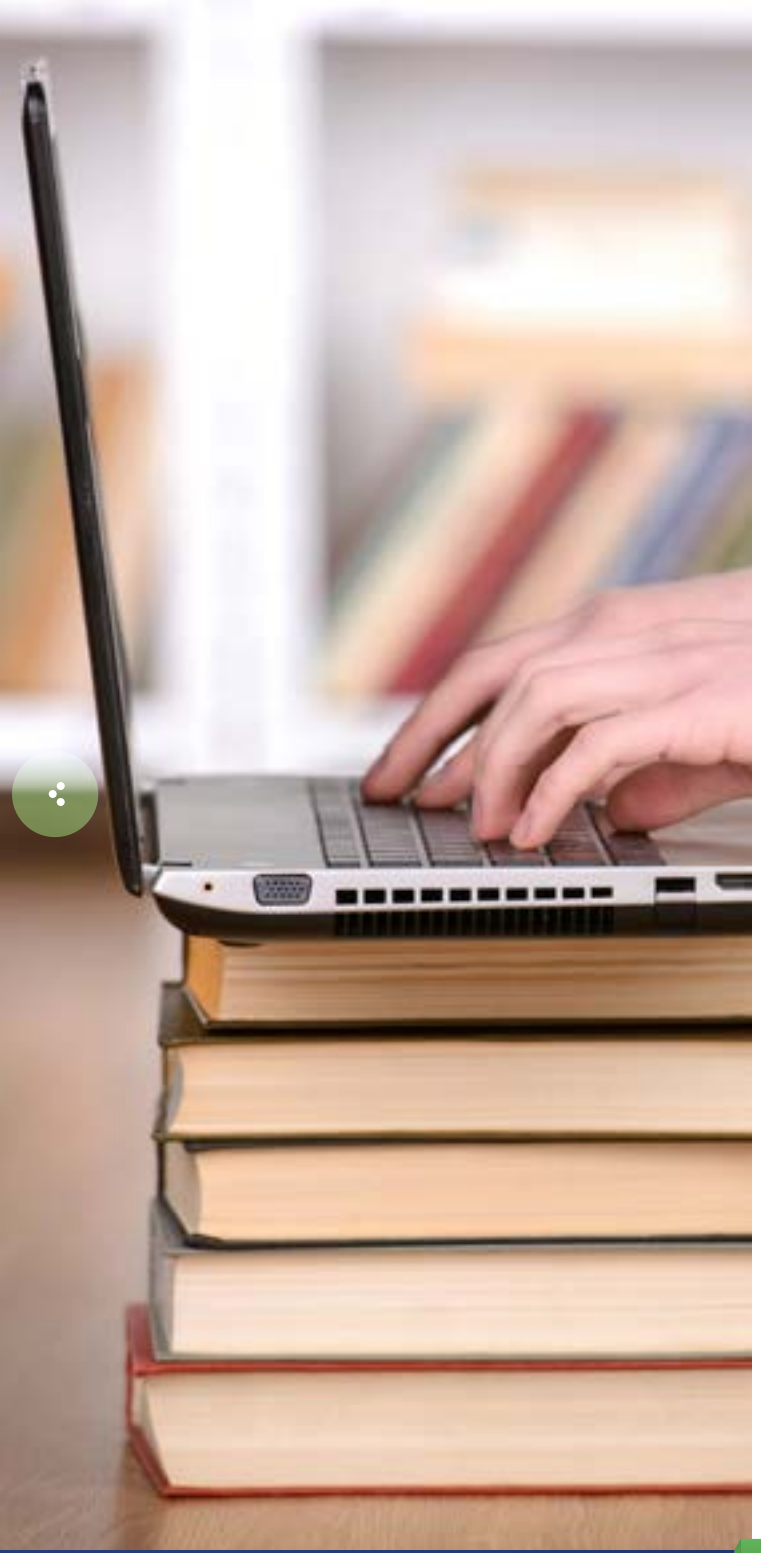
Key Drivers

- Increasing student engagement to create an active learning environment [41]
- Increasing direct teacher coaching for struggling students [40]
- Better infrastructure in schools
- More device penetration among students

Impact on the Future of Education

The use of technology in classrooms provides many opportunities for teachers to create an active learning environment while fine-tuning their teaching methods to address the weaknesses of the class. The teachers can monitor data related to student login times (study time), downloads/uploads. Learning analysis algorithms can scan through message boards to evaluate popular student problems and sentiments. The collaboration tools allow them to deliver graphical and textual content to their devices while engaging students in peer-to-peer learning. Further, real time data tools in classrooms allow teachers to assess how students cope with new concepts. With the current rise of BYOD initiatives, they are likely to be popular among schools in the future. This can result in development of some of the other tools discussed in this chapter to change the classroom experience as we have today.





Massive Open Online Courses

Access to quality education for everyone with internet access

A MOOC is an online college level course of study with publicly shared curriculum and open registration. [45] MOOCs provide an online social platform encouraging peer-to-peer study with accessible online resources from leading faculty members. As a major step towards global education, it allows massive number of people worldwide to access to a diverse range of quality content via web, which may otherwise be impossible to people such as in remote areas, from various backgrounds or who may aspire to achieve success. [46] Moreover, full time employees often use MOOCs to acquire new knowledge and skills required for their work at hand, while undergraduates use MOOCs for exam preparation. The content has trended in the form of digital books, short videos by renowned teachers, interactive content, quiz and assignments. MOOCs rely on self-motivation of the student creating a self-centered learning environment while collaborating with students with similar interests. The students interact via message forums or can arrange study groups for those who live in same cities. The growth of MOOCs has been immense, as the number of courses offered since their inception in 2012 has grown from 100 to over 700 in 2013. [47]

Facts

- Coursera, the market leader, offers courses from more than 100 universities to 5 million students in 2013 [48]
- MOOCs have grown by 10% in Europe, 12% globally [49]
- MOOC students are mostly undergraduates or full time employees [48]
- 90% opting for signature track successfully complete the course [50]
- Challenge: Often impossible to personally grade assignments due to number of submissions [51]
- Challenge: Insufficient tutoring for struggling students [51]
- Challenge: Average completion rate of less than 13% [52]
- Challenge: Time and money intensive to establish [53]

Key Drivers

- Democratization of education: access to as many people as possible [53]
- Universities use MOOCs to improve their image globally [53]
- Institutes use it as marketing tool to potential students, faculty and donors [53]
- Experimental Education: Many education researchers use MOOCs to experiment with new teaching methodologies [53]
- Education source for employees in corporate education [54]

Impact on the Future of Education

Many researchers fear that MOOCs may become watered down education. [53] However, many institutes see it as opportunity to reach out to more students while allowing them to optimize teaching methods by experimenting with MOOCs. Moreover, It has been promising to see that coursera was able to generate $ 1 million in revenue via their signature certificates; implying successful business models are possible with MOOCs. [54] The future of MOOCs may rely upon creating high quality, reputable and employer acceptable MOOC that can then be made affordable to a larger audience. However, the main challenges also lie in creating content and efficient grading to high number of students - which will likely be expensive.

Behavior Pattern Recognition in Machine Learning

Computers take over ever more mental tasks

Whenever there are huge amounts of data to be logically processed, machines outrun humans. Machine learning is defined as the structured learning by generalization of data. [55] Since 1965, the number of components on processors has doubled every two years, [56] opening doors for analyzing and learning algorithms, which would never have terminated on a 1960s machine. This is a precondition when thinking about estimating human behavior. Approximately determining expected actions and states can help overcoming this computational gap. [57] Recently, self-driving cars such as the Google Car have been trending. [58] Google uses machine learning algorithms to recognize behavior patterns of different objects on the street by logging and analyzing every mile the car drives. [59] Pattern recognition has various application possibilities, such as advertisement targeting. [60]

Facts

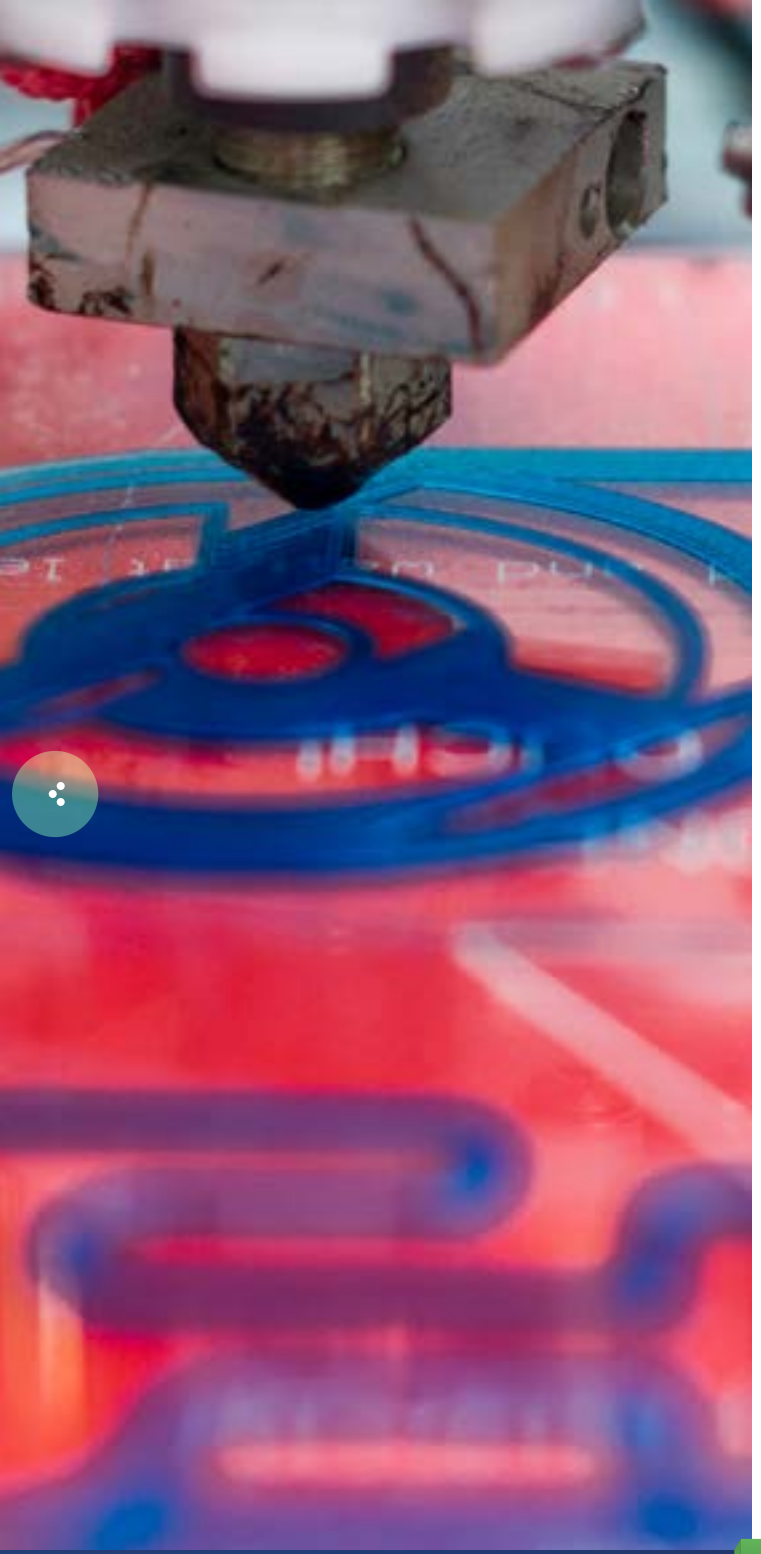
- Used in Wolfram Alpha, [61] Google Car and Adaptive task assignment
- Exponential growth of calculation speeds enables more efficient machine learning algorithms
- Machines started outperforming human professionals in certain medical fields in the 80s [62]

Key Drivers

- University and institutional research and funding
- Deep-learning algorithms like translators and search engines

Impact on the Future of Education

Machines are said to destroy jobs faster than they create them [63] - an objective observer would not have trouble finding this trend in educational sectors, because algorithms could take over repetitive tasks and give teachers more freedom for individual supervision. When analyzing patterns in learning behavior, new mechanisms supporting didactics can be implemented. Teachers will get access to an extensive insight in their students' progress. In the future, the structuring of lectures, the release of educational sources and the assembly of potentially dynamic exercises will be automated through algorithms.



3D Printers

Print digital 3D models at home using novel manufacturing technology

In most conventional product manufacturing procedures, material is removed from a bigger piece of raw material. In contrast, 3D printers manufacture components in layers, saving material and the need for any additional tools. Due to this additive process, constructing complex objects becomes possible and uncomplicated. The machine relies on a three-dimension digital model of the work piece, designed in software like CAD. [64] The used materials include various metals, plastics and even chocolate [65]- which make 3D printers applicable in a broad field of industries and costs are decreasing. In recent years, the availability of 3D printers increased consistently. [66] Current predictions of growth development assume 3D printer growth to skyrocket from 2015, reaching shipment numbers of 2.3 million in 2018. These predictions assume an increasing spread of 3D printers for private consumers. However, private 3D printer use is still a relatively new trend and likely to be overrated. [67]

Facts

- Already used for rapid prototyping in industry and architecture
- Experimental usage of glass, paper and organic matter
- Crowdfunding for successful 3D printing projects increased by 500% since 2011 [68]
- Few private users due to high equipment price

Key Drivers

- Growing integration of 3D printed objects in workflows
- Demand for rapid, cost-effective prototyping
- Faster development cycles in the digitized industry requires flexible production units
- Growing potential market due to various printing materials [69]
- Decreasing cost for more widespread use

Impact on the Future of Education

Since their price remains relatively high, it is likely that a small number of 3D printers will be available for shared usage in schools and universities. Things previously only visible in textbooks could soon be 3D-printed to be touched and played with. This could, for example, be applied in physics and math classes (e.g. using atomic models) as well as architecture lectures in universities (3D printing architectural models). In addition to the observing aspect, new creative challenges for students may inspire them. [70] Modern classes could combine digital 3D modeling with actually creating something tangible to prepare children for new tasks that become commonplace in the future.

Trends in Society and Customer Needs

- Shifting Role of Educators
- Students as Creators
- Personalized Learning
- Democratization of Education
- Edutainment
- Gamification
- Shift towards Lifelong Learning
- Just-in-time Learning

Trends in Society and Customer Needs

Social and consumer needs are at the forefront of educational change. These changes are facilitated by an increasingly interconnected society, new technology advances and adoption, and developments in behavioral science in understanding the learning process.

We have concluded that these developments lead to eight trends with regard to society and customer needs. First, there is a shift in the role of teachers. Indeed, teachers are no longer mere presenters of information, but are fast becoming coaches developing individual talents and teaching students how and where to find information. This trend is particularly apparent in 'flipped classrooms'.

Our second trend, students as creators, relates closely to this shift in the classroom. Students are increasingly engaging with digital technologies (that allow for customization and experimentation) to create their own educational content. This trend can also be noted on a societal level, with life-long learners and hobbyists contributing to educational content creation.

Third, there is a shift towards personalized learning, where students' specific needs (including disabilities) can be addressed through customizable learning platforms. Aided by assistive technologies and greater data analytics tools, students' progress can be more efficiently tracked and addressed.

Fourth, there is a trend towards a democratization of education. This trend deals with sharing knowledge at low costs or even for free, using massive open online courses (MOOCs) and platforms like Wikipedia. As a consequence, a broader demographic range of learners now has access to high-quality educational content.

Fifth, edutainment, the presentation of educational material with entertainment value, has dramatically risen since the development of content sharing sites like YouTube. Edutainment is expected to become more prevalent with further technical developments in augmented and virtual reality platforms.

Sixth, we address the rise of gamification. Technically, gamification (the implementation of game elements in non-game contexts) is an example of edutainment design, but is deserving of its own attention for its sheer size and impact. At a consumer level, this impact has resulted in market leaders in the educational app field such as Kahn Academy and Duolingo both gamifying their interface, and thus setting the benchmark for future online learning tools.

Seventh, consumers are increasingly engaging in lifelong learning. Educational content is becoming easier to find and more diverse online. As a consequence, people of all ages and backgrounds are increasingly turning to online education platforms to fulfill self-motivated ambitions to acquire and improve a variety of skills.

Eighth and finally, the immediacy of current information-sharing platforms has encouraged a trend towards just in time learning. While traditionally excessive amounts of information were taught, learners now have the option to access information and educational content if and when needed.

All together, these eight trends are shaping the future of education with respect to consumer and social needs.

Shifting Role of Educators

Teachers are shifting their roles from mere presenters of information to coaches adapting to individual needs and talents of students

For centuries, the role of educators was trapped in a „chalk and talk“ paradigm. However, new models of education, coupled with advancements in technology, are shifting this paradigm by transforming teachers into educational facilitators. [71] The concept of flipped learning has gained particular popularity over the past few years. [72] Work that was typically done in class is now done at home and vice versa. Students acquire knowledge by themselves at home in the form of recorded lectures, videos, podcasts or simulation games. The time spent in class is used interactively for group work, discussions and questions. [73] Thus, the role of teachers shifts from presenters of information to supportive coaches that foster students individually. [74] They also prepare students for autonomous work by teaching them how to search for information on their own – an important skill considering today's society of information clutter. [75] In particular, young "Generation Y Teachers“ are eager to follow this way of teaching. They are open to teamwork, constant communication, and the use of new technologies. As a consequence, they are more engaged in the academic progress of their students. [71]

Facts

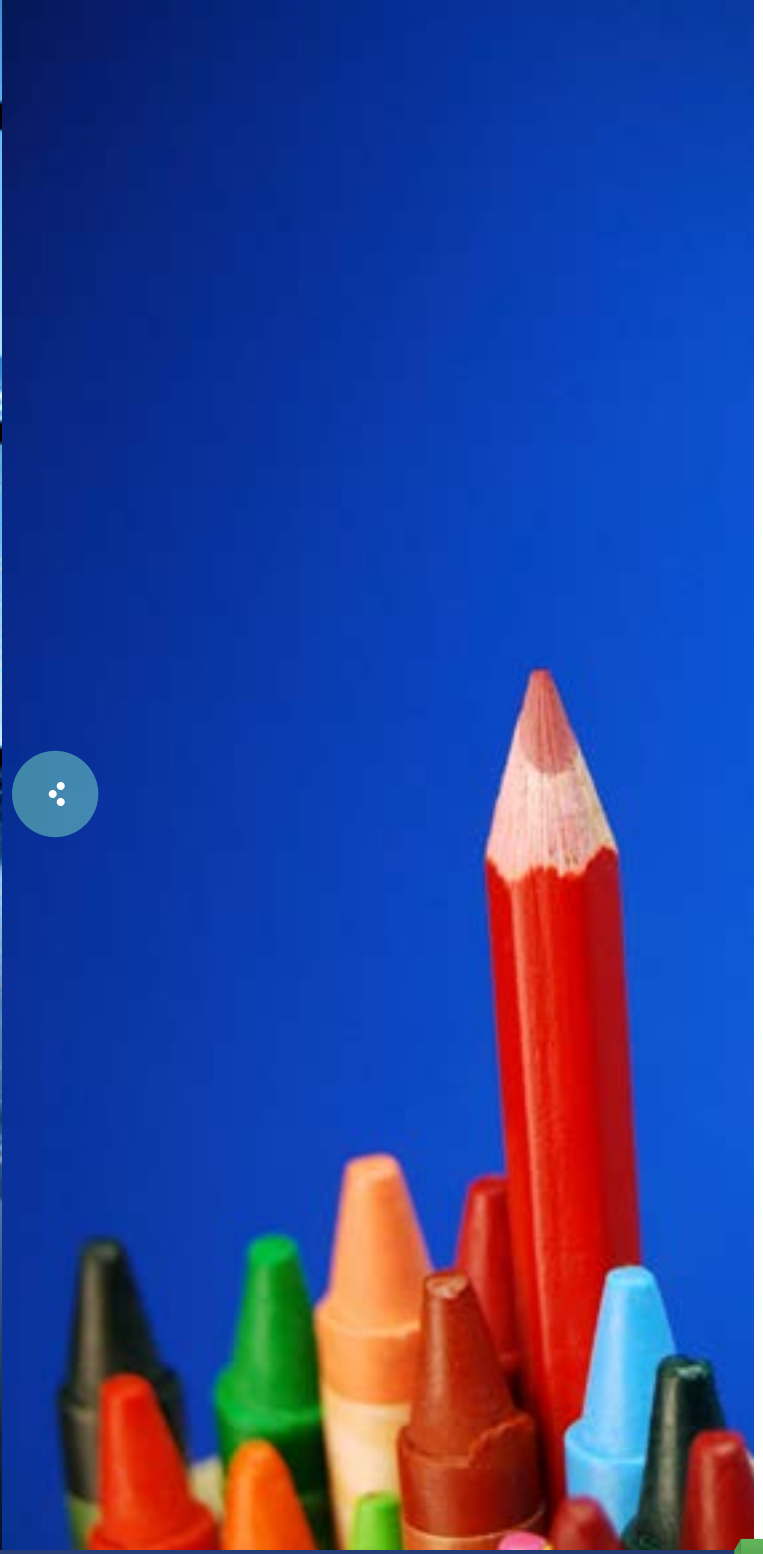
- In a study of 2,400 teachers, 78% had flipped a lesson in 2014, compared to 48% in 2012 [76]
- Flipped classrooms improve the classroom experience with less lecturing and more hands-on activity [74]
- Pearson and the Flipped Learning Network™ offer courses and content for educators who want to flip their classes [77]
- Challenge: Acceptance of and training in using new technologies (especially for older generation teachers) [77]
- Challenge: The production or purchase of content [74]
- Challenge: Developing assessment systems to make sure that students actually master the content and prepare themselves before attending class

Key Drivers

- Adoption of digital technologies to learning contexts
- An increasingly interconnected society that allows students and teachers to communicate and work online
- The acknowledgement that people are individuals, implying that education should be adapted to personal needs
- Young "Generation Y Teachers" (born after the 1980's) who are willing to experiment with teaching formats

Impact on the Future of Education

In the future, the focus will lie on getting more teachers involved with the new concept by supporting them technically, with content, and by establishing reliable systems to control and analyze students' participation. Moreover, with flipped learning, education will change from a teacher-centered approach to a more student-centered one. As a result, the individual face-to-face time between students and teacher will be maximized, which will encourage better student performance as well as job satisfaction of teachers. [73] This concept though, requires skilled teachers who can fill the role of coaches that recognize the individual needs of their students and foster their talents. [74]



Students as Creators

Students are increasingly becoming creators of their own educational content

Alongside the rise of the Web 2.0, where consumers are expected to contribute to content creation as they consume it, educational institutions and platforms are increasingly encouraging students to create and actively interact with educational materials. [78] Schools and universities have traditionally been criticized for inhibiting creativity by enforcing a paradigm of passive information consumption. Nowadays, modern educational institutions are beginning to encourage "value-added" learning through a decreased focus on unidirectional instruction and increased focus on student created content. [79] Assisted by advancements and the adoption of digital technologies, which allow wide-reaching access, students can now easily interact with and alter content. For example, students are increasingly encouraged to use blogs, wikis, podcasts and audio-visual recording and editing tools. In some cases, this creation even extends to students customizing their own curriculums. Meanwhile, on a societal level, lifelong learners and hobbyists are also involved in a movement towards content creation; for example individuals may contribute to Web 2.0 platforms or makerspaces (physical locations where people collaborate on projects with the aid of shared resources and technologies). [78]

Facts

- Students take more ownership of their education, developing a natural curiosity and impulse towards self-motivated learning [79]
- A trend towards creativity can make students more attractive employees, with about 60% of CEOs polled citing creativity as the most important leadership quality [78]
- Science literacy at a societal level is expected to rise with the increased popularity of Web 2.0 and collaborative content creation platforms [80]
- Since their infancy in the early-2000s, there are now more than 750 makerspaces across the globe, allowing life-long learners and hobbyists to create and experiment [81]
- Challenge: Sharing and feedback of content on web 2.0 platforms can open the door to cyber-bullying [82]
- Challenge: There are concerns the rise of online interactivity is replacing face-to-face communication, which is believed to elevate levels of narcissism and wasted time amongst young people [83]
- Challenge: Content creation raises legal and policy issues relating to authorship, intellectual property and, in the case of physical creation spaces, personal liability
- Challenge: There is a lingering prejudice against material that has not been 'published' in books

Key Drivers

- Web 2.0: The development of interactive and networked technologies
- Societal demand for more interactivity with educational content
- Research in behavioral science revealing the central role of interactivity in educational development [84]

Impact on the Future of Education

Students will spend a higher proportion of their time with active thinking tasks than they have done so in the past, as mere consumers of information. [80] As student technical literacy increases, interactive and collaborative practices in schools are expected to assume a more central role in classrooms and lecture halls. Moreover, consumer and student creators are expected to reduce education costs associated with production, design and publication of content and material.

Personalized Learning

Flexible, specific and individualized learning formats are on the rise

Personalized learning involves defining the pace and strategy of the learning experience according to the individual's own needs. The term covers educational programs, academic-support strategies, and instructional approaches intended to address specific needs, skills, interests and cultural backgrounds. [85] Individualized learning is focusing on the learner contrary to learning in traditional classrooms. [86] Personalization does not only refer to personalization of content, but also to the way of learning. [87] For example, in the FlexPath program of the Capella University, students can work through material that fits best to their already acquired skillset. Instead of receiving credits for a degree, students can earn competencies (e.g. "Basics of Management" or "Basics of Technology"). [85] Moreover, the rise of assistive technology (AT) devices and services also creates opportunities to include people with disabilities, meeting the growing number of consumers with special needs. [88]

Facts

- In 2011, 32% of all U.S. students took at least one online course [89]
- The outcome of online learning is comparable to face-to-face education [88]
- Starting with low-tech AT (e.g. pencil grips, writing guides) the number of AT items to support students with memory, organization, problem solving, reading, writing and math is increasing [88]
- Challenge: Data-driven, scientific approaches to facilitate personalization are still at an early stage of development [85]
- Challenge: Educators need to appreciate the additional values of analytics-driven personalized learning [90]

Key Drivers

- Widespread adoption of digital technology learning tools
- An increasingly interconnected society that allows students and teachers worldwide to communicate and work online

Impact on the Future of Education

People learn best when they are engaging with the content. This engagement will consequently continue to be deepened if mistakes made by students can be closely analyzed, and individual content can be generated. Every student will be able to work through the content with the strategy that best fits his or her needs in order to optimize the learning experience. Similarly, adults should become more familiar with such learning formats in the future. AT will also assist them to pursue lifelong learning while their vision and hearing abilities decrease. [91]

Democratization of Education

Access to education is becoming available to a much larger part of the population

Equal access to education and opportunities was heavily constrained by limited financial and technical resources in the past. Democratization of education was based used to focus on the new allocation of financial resources and the reduction of school fees and material costs. [92]
However, recent advances in digital technologies created entirely new possibilities with respect to the democratization of education. With the emergence of digital and free content offered by Wikipedia and Massive Open Online Courses (MOOCs) it has become possible to supply everyone connected to the internet with knowledge and even education in an easy and cost-efficient way. The democratization process also extends to traditional education systems. The production of educational content is becoming more standardized, shifting education from a craft towards an industry. This reduces the effective cost per student and enables more students to obtain higher education. [76] According to the British Institute for Public Policy Research (IPPR), this trend leads to "mass-universities" supplying an increasing share of population with higher education. [93]

Facts

- Effective cost-per-student of universities using online education tools decreased by 34% from 2006 to 2013 [76]
- The online enrollment as percentage of total university enrollment in postsecondary institutions in the USA rose from 9.6 % in 2002 to 32% in 2011 [94]
- Khan Academy offers over 4000 online lectures in 28 languages for free [95]
- Challenge: Copyright and data security issues [95]
- Challenge: Despite the global accessibility to MOOCS, most are used by white, middle-class students [96]
- Challenge: Dropout rates of MOOCs are high even for those offered by MIT, Stanford and Harvard (90%) [97]

Key Drivers

- An increasingly interconnected society: allows students and teachers worldwide to communicate and work online
- Digital technology advancements
- Rising demand for higher education: 80% percent global growth during the last 10 years [98] and a forecasted 2% growth per year in the USA until 2025 [99]

Impact on the Future of Education

The democratization of education is vital as the global demand for higher education is growing rapidly. [98] Although a simple internet connection gives access to extensive educational resources such as MOOCs the democratization process can only succeed if the web-based education technologies are able to substitute traditional labor-intensive education methods. A recent study suggests that online courses negatively impact student performance compared to traditional face-to-face courses. [100] This demonstrates the democratization process of education is encountering substantial challenges that must be solved in the future. MOOCs, for example. are struggling with high dropout rates of around 90 percent. [97] Likewise, it has been shown that MOOCs are mostly used by highly motivated, middle-class students instead of lower class students. [96] Nevertheless, the democratization of education could potentially close the information gap that has traditionally divided classes and countries and thus lead to radical social changes in the near future.

Edutainment

Educational materials are progressively moving towards more entertaining and interactive designs

Since the first fables were told, educators have attempted to blend educational material with entertainment. [101] However, with modern advancements in digital technology, 'edutainment', or "primarily educational content with an entertaining value" is becoming more prevalent. [102] This trend has been propelled by digital technologies that allow educational content to be enriched with interactivity, audio-visual content, and playful or game-like design. [103] Assuming that educational institutions and life-long learners continue their current trajectory of incorporating and developing digital technologies within their learning spaces, students of all kinds will continue to be exposed to educational material in novel and entertaining ways.

Key Drivers

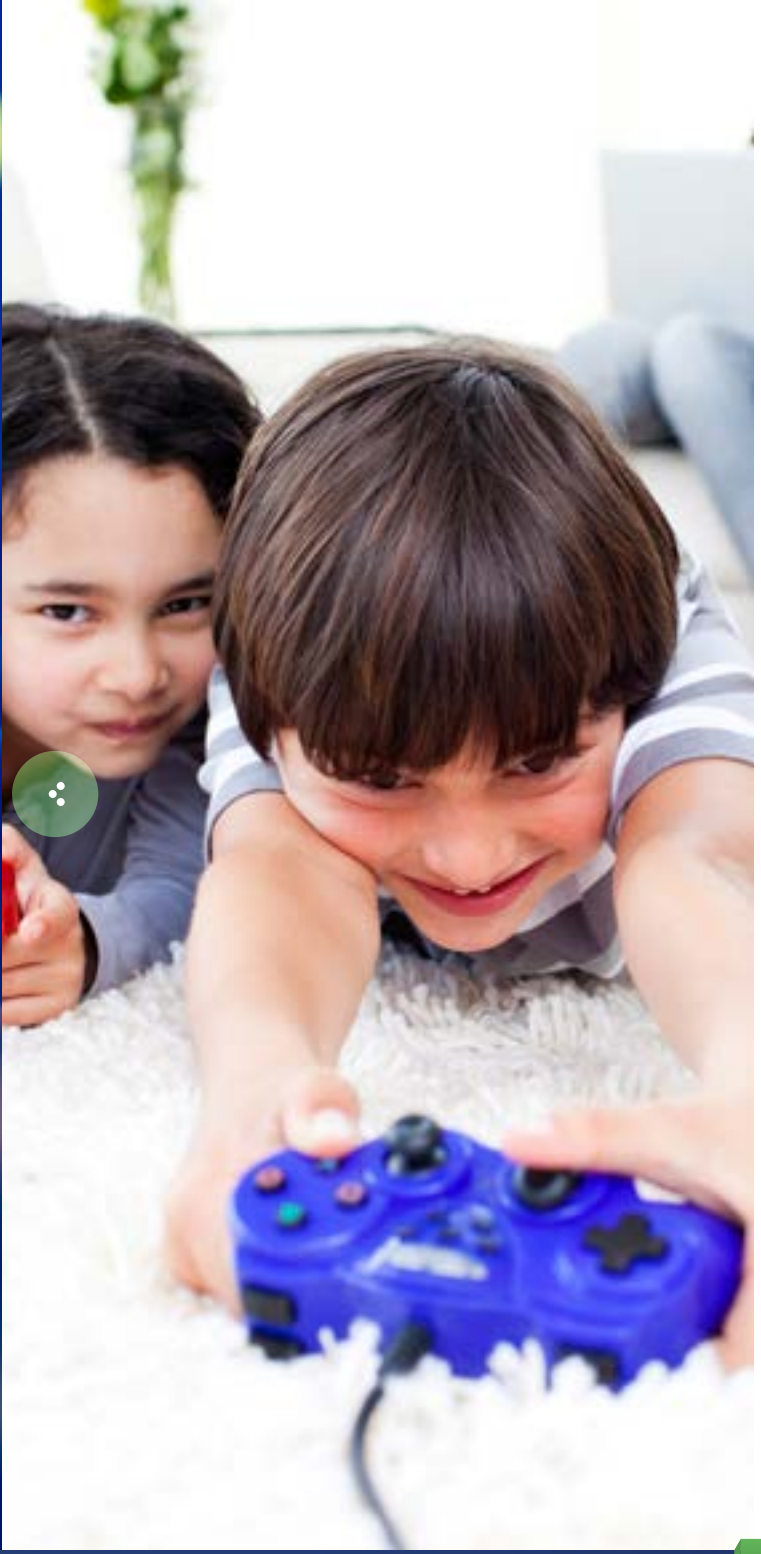
- The rise of cheap and ubiquitous educational software and hardware
- The increased customizability and content variation made possible by digital technology
- Advancements in behavioral science understanding of play as crucial to learning process [84]
- Information clutter: People seek out more engaging and interactive content in the rise of "information overload"

Facts

- Prominent example: Duolingo, which employs gamification (one form of edutainment), was found to teach language learners content three times faster than traditional classrooms. It won Apple's App of the Year Award in 2013 [104]
- TED talks, and educational lectures presented in highly stylized and entertaining ways are increasingly popular sources of information. TED talks have been viewed 500 million times in the first five years of being on YouTube [105]
- The educational gaming sector is the fastest growing in the game industry [106]
- Challenge: Gamification and serious games are expected to enter a "trough of disillusionment" on Gartner's Hype Cycle for Emerging Technologies [107]
- Challenge: Information presented in entertaining ways can easily be perceived as unimportant [108]
- Challenge: Edutainment may not prepare students for formal testing and traditional forms of non-interactive learning they may encounter in later life

Impact on the Future of Education

Educators will continue to shape education in an edutainment mold in the future, with gamification, serious games, and playful design leading this trend. Furthermore, as more students around the world get access to content sharing platforms like YouTube, edutainment (particularly in video form) will reach new demographic groups like the elderly or people with little to no income. Similarly, advancements and adoption of digital technologies that allow for customized, interactive and high engagement (such as Virtual Reality platforms) will enable education to be presented with yet further entertainment value. As a consequence, the line between skill and knowledge acquisition and fun will be further conflated; and edutainment will be widely acknowledged as the Trojan horse of education.



Gamification

Educational content is increasingly being presented in more playful and game-like formats

Students have long been incentivized through reward schemes, but since 2010, gamification, or the "implementation of game elements in non-game contexts" has become an increasingly popular and effective form of incentivizing users of digital media. Digital education platforms have been at the forefront of this trend by including virtual badges, online leader boards, and user-specific progress pathways to increase user engagement and learning speed. [109] These initiatives can be noted in platforms designed for school-aged students, as well as in corporate processes and training methods. [110] Moreover, the trend towards gamified applications is expected to grow in parallel with developments of digital technologies that offer easy replayability and precise customization of the learner's needs. [84] However, gamification in general faces some challenges, largely due to the misappropriation of the term and the overuse of game elements in inappropriate contexts. [111]

Key Drivers

- Widespread adoption of digital technology learning tools
- Information clutter: People seek out more engaging and interactive content in the rise of "information overload"
- Increased living standards: In societies where fundamental needs are more easily fulfilled, consumers demand higher-order stimulation like play [84]
- Advancements in behavioral science stating play as crucial to learning process

Facts

- Behavioral scientists suggest play and the "freedom to fail" afforded by Gamification is particularly suited to learning new skills [84]
- In 2013, it was estimated over 70% of Global 2000 organizations would have at least one gamified product by the end of 2014 [110]
- In 2013, it was estimated that over 50% of companies involved in innovation would gamify their processes in 2015 [112]
- Prominent example: The highly gamified language-learning application, Duolingo, was found to teach users the same content three times faster than traditional classrooms. It also won Apple's App of the Year in 2013 [104]
- Challenge: Some users are unfamiliar with game designs and the complexity of gamified user interfaces [111]
- Challenge: There is a lingering skepticism of 'game elements' and a belief games are only appropriate for a narrow demographic [111]
- Challenge: Gamification must be used sparingly and in correct contexts to reverse its growing "buzzword" reputation. [111] In 2014, it was estimated 80% of gamified content failed to achieve objectives of content producers primarily due to poor design [113]

Impact on the Future of Education

While Gamification generally faces some short-term challenges and is expected to enter a "trough of disillusionment" on Gartner's Hype Cycle of Emerging Technology, [107] it will continue to infiltrate and positively impact education platforms. With the unprecedented success of gamified platforms like Duolingo and Kahn Academy, gamified education content is quickly becoming a standard amongst online education platforms. Meanwhile, gamification is similarly expected to play a greater role in corporate training and innovation processes, where traditionally unappealing material can now be presented in novel and playful ways. Furthermore, advances in simulation-friendly technologies such as virtual reality and augmented reality devices will also support the rise of gamification in both corporate and consumer education markets.

Shift towards Lifelong Learning

Adults of all ages are increasingly self-motivated learners and are continually acquiring new skills and knowledge

Lifelong learning involves all learning activities intended to improve knowledge and skills from a personal, civic, and employment perspective. [114] Previously, lifelong learning was constrained by a lack of access to educational material; but today, individuals have access to educational content online and are able to pursue their personal learning inclinations. [114] Recent developments in technologies such as MOOCs and subject-specific educational platforms are enabling lifelong learners to pursue avenues previously out of reach. Furthermore, higher technical literacy and more user-friendly interfaces allow larger demographic segments (particularly the elderly) to engage with novel educational material. As a consequence, education is far from over once students leave school or university.

Facts

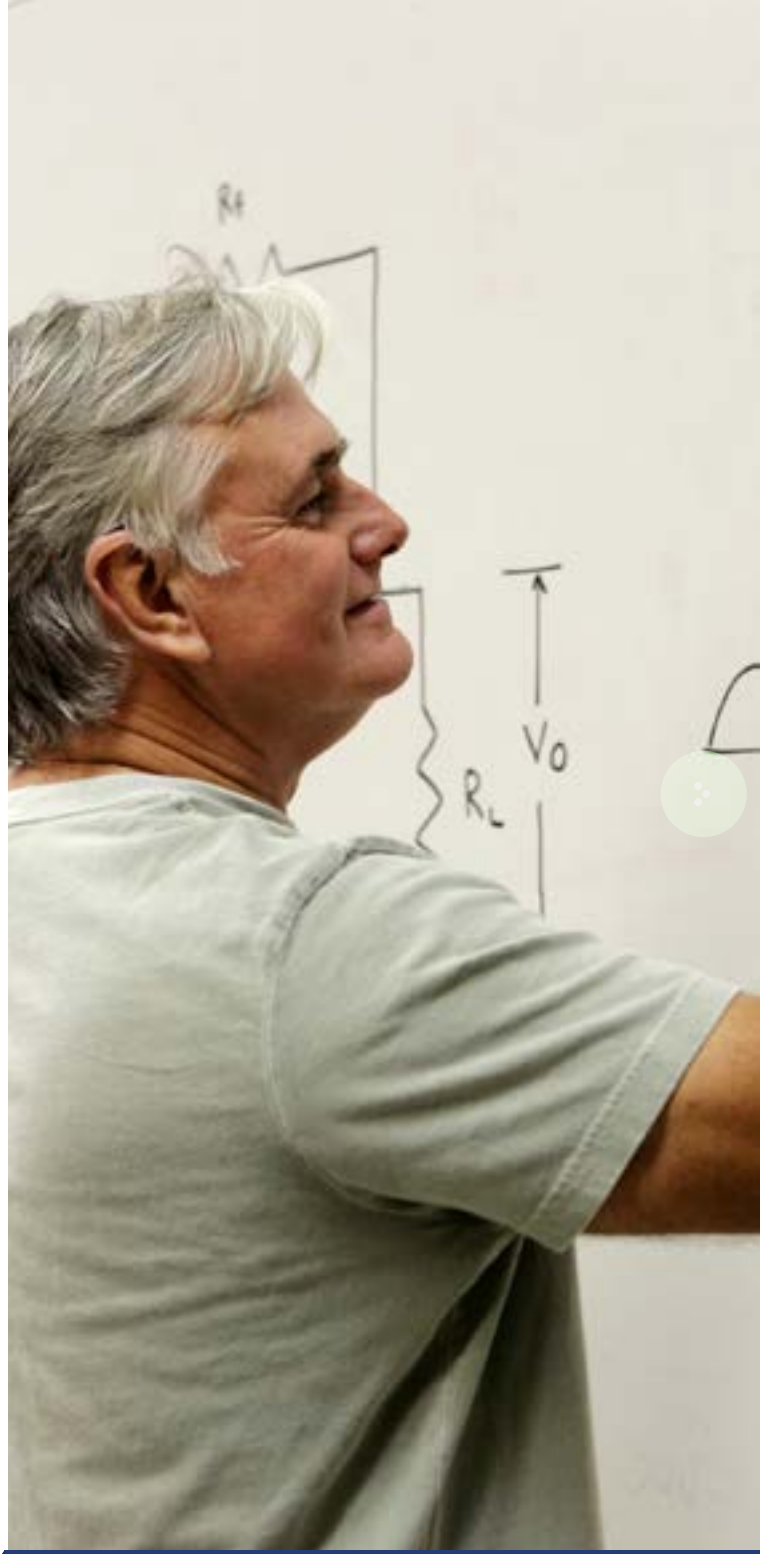
- 25% of individuals name developing themselves as a person as reason for engaging in adult learning. 17% say it gives them pleasure [115]
- Traditional classrooms have been found to be less intrinsically engaging than language learning online platforms [115]
- Distance learning helps overcome institutional barriers such as class scheduling and entrance requirements
- The organization EUBia informs elderly people about online lifelong learning opportunities available to them [116]
- Challenge: Currently, there is a steep decline in learning for those aged over 65 years due to technical illiteracy [114]
- Challenge: Limited availability of technology [114]
- Challenge: Class, employment status and age still influence involvement in lifelong learning practices [114]

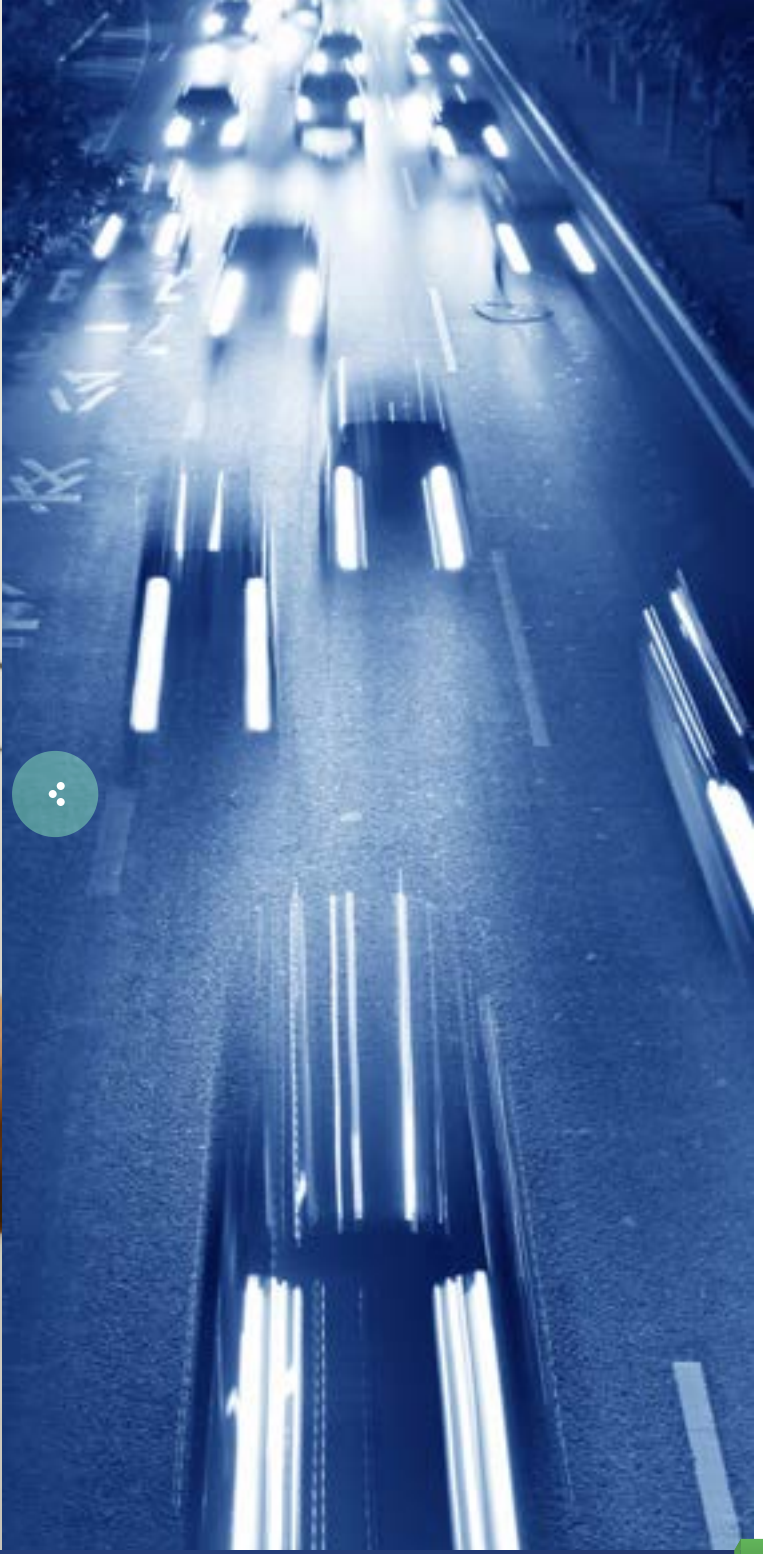
Key Drivers

- An increased need for individualization amongst members of society [117]
- An aging population with more leisure time
- Increased living standards: in societies where fundamental needs are more easily filled, consumers demand higher-order stimulation. [84]
- A development of more diverse educational material online

Impact on the Future of Education

Although some lifelong learning skills have been criticized for lacking transferability, new technologies such as MOOCs are increasing opportunities for adult learners. Assuming adult learners, especially the elderly, are able to overcome entry barriers to online education, the lifelong learning market will continue to grow. Similarly, in western societies, the population is aging. Hence, more people will have more time to learn skills outside of traditional education streams. Moreover, educational platforms are diversifying, and in the future, learners will have a greater opportunity to learn a wider variety of skills.





Just-in-time Learning

Students are increasingly seeking information and education when they need it

In the past, the traditional system of "Just-in-case learning" (JICL) was predominant. With an excessive amount of information being taught in advance by teachers or professors, a person acquired knowledge that he or she might need "just in case." [71] Nowadays, a shift towards "Just-in-time learning" (JITL) can be observed. Society shows a need for getting the necessary information to solve real-world problems such as learning how to fix the tire of a bicycle or how to solve a computer problem. [118] Through means of new technologies, learners now have the option to access information and educational content if and whenever needed, while being independent from teachers or schools mediating the access. [119] By using instant messaging and live forums anyone can ask anyone for anything at any time. [120]

Facts

- Search engines allow anyone to find information from multiple sources within seconds [120]
- Just-in-time learning follows the simple process of watching and copying a skill
- A How to video about coloring eggs has almost reached 55 million views on Youtube [121]
- Universities worldwide, offer free online courses like "An introduction to music production" [122]
- Online content can be changed immediately when additional information is required
- Challenge: Assessment and feedback availability is limited
- Challenge: Availability of the right resources (internet, mobile device) at the required time

Key Drivers

- Widespread adoption of technology, to enable people to readily access knowledge/information irrespective of place or time
- Need and interest in information as per requirement and on immediate basis
- Easy access to information online

Impact on the Future of Education

Although JITL faces some challenges like the degree of search-ability (the best content cannot resolve a real-world problem if it is not found by the user), it is going to play an important role in the near future. JITL is not going to replace the learning of the classroom or face-to-face learning, but is best used as a supplement. Also, the elimination of refresher trainings is a great advantage of JITL, because it does not only save time when learning new content (that may not be used by a person), but also saves time when you have to repeat the newly learned content in order to not forget it.

Corporate Education and Lifelong Learning

Continuous Education of Employees

Employee- Centered Education

Corporate Online Training

Rise of Non-Academic Certificates

Corporate Universities

Knowledge Sharing among Employees

Employees as Soft-Skill Experts

Corporate Education and Lifelong Learning

Education does not stop when people enter work-life, but simply changes with a heightened focus on job-specific knowledge and personal development. The following chapter provides an outlook on major trends in corporate education.

Corporations have noticeably intensified their investment in the ongoing education of their employees to stay competitive and to satisfy employee desire for self-actualization. Continuous education comprises the knowledge acquired through personal experience and official trainings. A closer collaboration between higher education and industry would facilitate a smoother transition between both environments.

The standardized, instructor-based corporate training is incrementally replaced by personalized and self-regulated learning. Personalized training methods are tailored to individual interests, increase learning satisfaction and eventually corporate performance. Corporate efforts to expand personalized education offerings can be expected in the future.

One form of personalized education is enabled by e-learning, which is still rising. In combination with face-to-face training, called blended learning, companies have powerful training tools. E-learning might play a key role in educating the increasing number of potential workers in times of the rapid economic rise of developing countries.

MOOC certificates jointly offered by both academia and industry, such as those offered by Udacity, are an alternative to traditional academic degrees. Certificates offer the potential to help close the rapidly widening skills gap between skills taught in higher education and industry demands.

Corporate universities are gaining in importance in corporate education. Corporate universities foster a company's ability to change as they are designed to strategically assist the parental organization. Close cooperation between corporate and public universities might help to standardize accreditation processes and increase comparability between certificates, but result in a direct competition among both.

Corporate universities can also boost knowledge sharing among employees. The broad availability of knowledge through Web 2.0 technologies like wikis increases the accessibility of specialized knowledge as a source of innovation. Companies need to implement a knowledge sharing culture and provide an infrastructure that facilitates the exchange of knowledge by employees mutually teaching each other.
By promoting collaboration of employees, interpersonal skills will become a central requirement for future employers. Among graduates, however, there is a reported lack of communication skills. Corporate education will in particular focus on soft-skill development programs to boost communication and collaboration.

Continuous Education of Employees

Increasing need of corporations to continuously educate their employees

Fast-paced technological innovation and the growing global competition within the last decades has increasingly placed pressure on companies to constantly update their employees' knowledge and skills. [123] Moreover, companies have to deal with an aging active workforce and fewer younger employees entering the labor market. [123] This development increases the importance to retain talent within the company. [123] Consequently, companies direct a growing effort towards the ongoing, lifelong, education of their workforce [124] as employee's knowledge and skills are essential to stay competitive. [125] Continuous learning at the workplace can be distinguished between formal and informal learning [126] Formal learning occurs in organized training and learning contexts and produces explicit knowledge and skills. [126] Informal learning primarily yields implicit knowledge and can be acquired by mentoring, coaching or online social networking. [127] In order to convert tacit knowledge into expertise, both informal learning and formal training should be combined. [126] Continuous learning can occur by e-learning with the opportunity to contact teachers or educational supervisors at any time either face-to-face or virtually. [128] Corporate universities also combine both company specific knowledge and development of employees. [129]

Facts

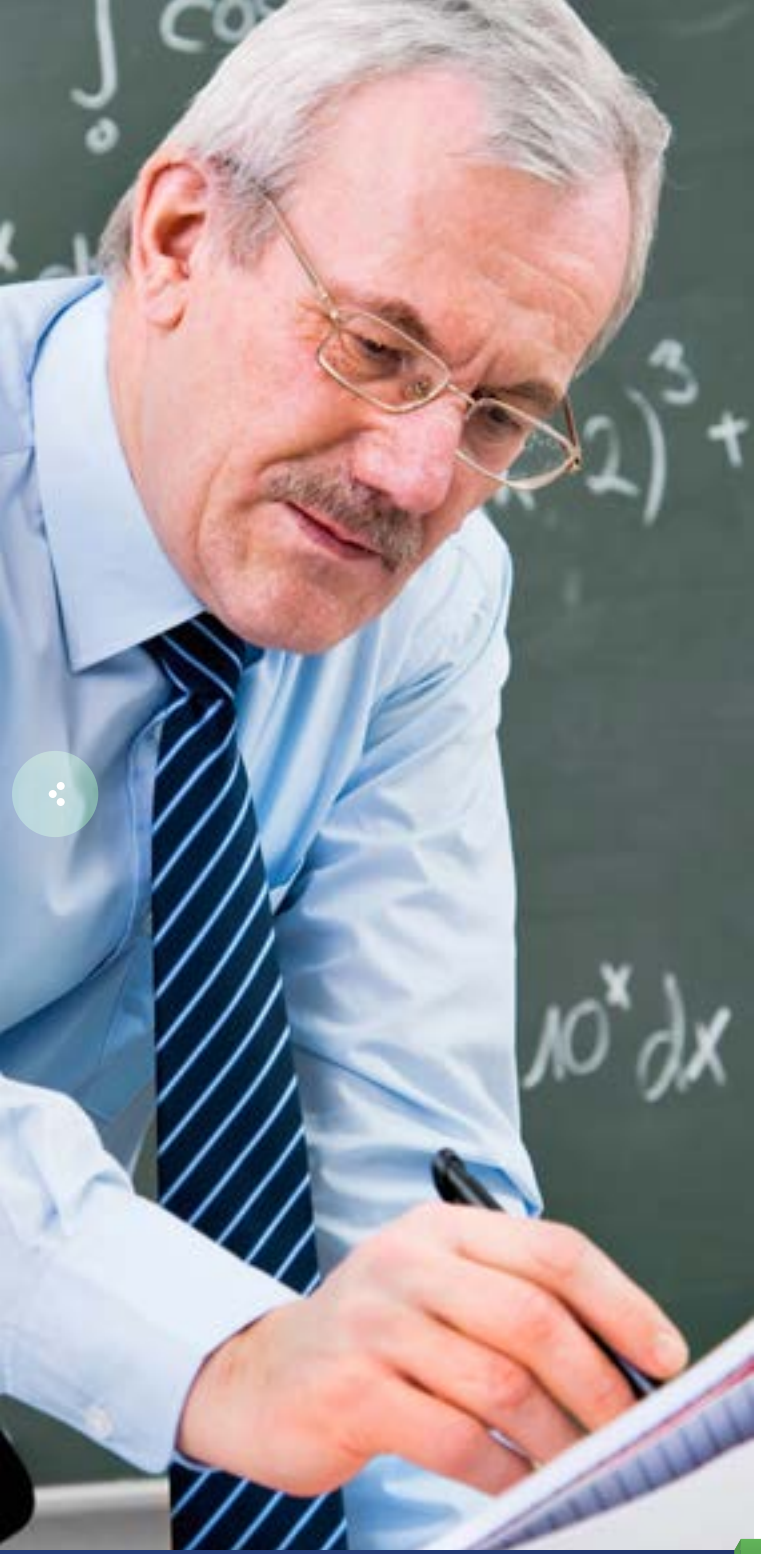
- Research shows that companies offering education and development programs have a higher employee retention rate [125]
- Modern Web 2.0 technologies enable employees to engage in informal, just-in-time, and day-to-day learning [130]
- Since the recession in 2008/09, companies have constantly increased their investment in employee development, whereby mature organizations not only cover short-term training but also identify capability gaps and develop training programs to close these gaps [124]
- Successful and innovative tech-companies in the US exceed the average of U.S. companies with $1,847 investment in employee education by 58%, as they want to develop their workforce towards solution and industry experts [124]

Key Drivers

- Emerging Web 2.0 technologies (going mobile, social media, etc.) allow for new modes of corporate teaching and learning
- Employers are depending on continuous training of their aging workforce
- Intrinsic motivations, like the desire of self-actualization and human curiosity, are part of explaining the continuous need of employees for further education
- The half-life of knowledge is steadily shrinking and requires employees to continuously update their knowledge and skills
- Employees do not follow a predetermined career path but might pursue their career across different companies in different industries. This requires the ability to quickly re-orientate oneself in new environments and to continuously absorb new information

Impact on the Future of Education

The increasing effort of companies to invest in the education and development of their employees mirrors their need to attract and retain highly skilled workers. Education no longer stops at tertiary education but continues at the workplace. Corporate entities will consequently become a driving force in education and actively contribute to conveying skills needed in the industry. In order to smoothen the transition from rather formal learning environment in schools to learning in corporations that also demand the acquisition of implicit knowledge, a close collaboration is required. This implies that education in schools should adopt particular components of workplace education and vice versa. In future recruiting processes, companies may focus less on an applicant's existing qualifications but more on his/her learning capability.



Employee-Centered Education

Increasing effort of corporations to tailor educational concepts to individual needs and interests

Traditionally, companies invited their employees to a standardized and instructor-based training process. [132] However, this "one-size fits all" model of corporate training is outdated and can no longer effectively satisfy the individual employee's interests. [133] Research confirms that an individual learning style, different motivations and interests influence the absorption of information. [133] The rising personalized education approach is tailored to the individual interests, pace, and previous scope of learning experience. [133] Moreover, empowering the individual employee to control the learning process might improve learning satisfaction during the learning experience [133]. This in return benefits companies; higher learning satisfaction increases job satisfaction and hence employee retention. [134] Besides online-based courses [133] and tutorials, [135] learning analytics are a suitable tool for companies to tailor educational programs exactly to the needs of their employees. [136] Learning analytics refers to collecting, analyzing and reporting data about employees and their work environments to understand and optimize learning. [136] For instance, Google suggests to managers courses based on their employee's reviews. [137] Therefore, the company collects data from current and former employees, analyzes them and proposes courses to managers. Eventually, corporate education moves from a company-organized "push" training to an employee-regulated "pull" form of learning with individual learning resources. [132]

Facts

- Authentic learning (connects contents taught in formal learning environments with real-world problems) [138] and blended learning (combines both online and in-person learning experiences) [138] are specifications of personalized learning
- An increasingly international workforce requires learning concepts that can be tailored to different levels of employee education in order to ensure good collaboration [139]
- Personalized learning can account for cultural differences concerning learning formats and varying motivations to learn [139]
- Challenge: Especially for learning analytics, transparency about data protection, ownership and privacy is required to prevent distrust of employees towards this method [140]
- Challenge: Provision of reusable learning content in an adaptive e-learning environment [133]

Key Drivers

- Employees expect education to be instantaneously accessible due to a growing mobility and flexibility of the workforce and to be tailored to their needs.
- Need for continuous education in a fast changing working environment.
- Big Data analyzing methods allow complex analyses of employee's background and previous learning experience.
- Personalized learning is supported by the growing interest in e-learning offerings.

Impact on the Future of Education

The future lies not in standardized, instructor-based training but in self-directed learning tailored to the interests of each employee. This employee empowerment might enhance an employee's motivation, the ability to assume creative tasks and eventually, corporate performance. The motivation for personalized learning might also be increased through offering promotions based on the results of personalized education. A solution is still to be found to measure the outcomes of personalized learning and make the individual learning paths of employees comparable. Furthermore, personalized learning might increasingly foster personal development, for example by a new format of corporate mentoring with software that matches new hires and experienced seniors and tracks the individual learning curve.

Corporate Online Training

Integration of E-learning for more efficient corporate training

As a consequence of the internet, teaching and learning are no longer limited to the traditional classroom but can adjust to employees' mobility. [141] Companies respond with increasing offers of online learning: in 1995, only 4% of US companies made use of E-learning in their professional development programs whereas in 2014, this number rose to 77%. [142] Online training enables employees to learn from a remote position at their personal pace with multimedia content prepared by experts, which can be accessed electronically via the internet – independent of time or geographic boundaries. [141] The development from instructor-based training to E-learning can be explained by closing skill gaps, i.e. to eliminate disparities between employees' abilities and competences required by the job. [143] Also aspirations to personalize education are a potential explanation as online courses can individually be chosen from a database. Companies expect a decrease in training costs due to possible reduction of training staff costs and increased overall training efficiency. [144] The blended learning approach combines both distributed online learning environments and classical face-to-face teaching. [145] This combination might become a powerful learning tool, as it is personalized and cost-efficient at the same time. [145]

Facts

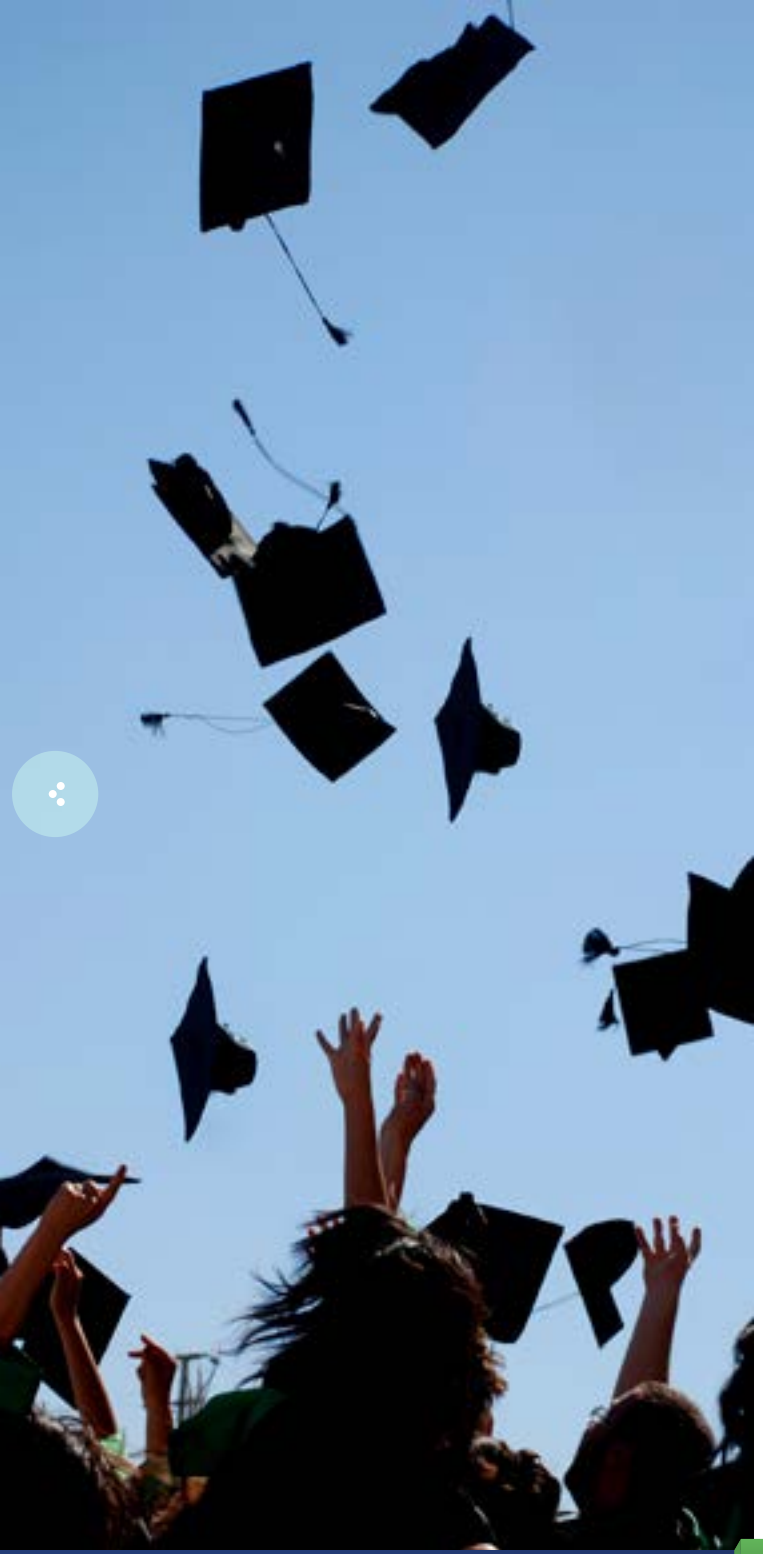
- The worldwide market for E-Learning is assumed to grow to $51.5 billion in 2016 [146]
- 74% of companies currently deploy Learning Management Systems (LMS) and Virtual Classroom / Video Broadcasting systems [143]
- 29.1% of corporate training are delivered by blended learning [143]
- Overall training expenses in the US grew by 6.6% from 2013 to 2014 [143]
- The US market for corporate e-learning in contrast is expected to grow by 13% per year [142], in India the growth rate is 55% [147], revealing an even larger market potential in Asia
- Challenge: Potential risk of information security breaches resulting in loss of company knowledge [148]

Key Drivers

- Company efforts to become more cost-efficient through minimized educational staff and cheaper maintenance costs
- Demand for individualization, e.g. adjustable learning pace and course choice
- Increasing need for easy knowledge distribution in countries with large populations, such as China and India
- Ambitions to adjust with the increased mobility and flexibility of employees
- Workforce specialization requires in-depth training and knowledge sharing

Impact on the Future of Education

Online education is a major trend, fully embraced by both academia and industry, and is still evolving rapidly as can be seen by the surge of MOOC platforms. Mobile solutions allow the studying of individualized content in a flexible and location-independent way. With the rise of economies in China and India there will be an growing number of workers in need of training. E-learning can lead from small-sized classrooms to large-scale decentralized learning. Research predicts China, Indonesia, India, and Brazil to become top buyers of alternative learning techniques by 2017. [150] Increased collaboration between corporations and universities might lead to more publicly available online courses.



Rise of Non-Academic Certificates

Emergence of alternative educational credentials as job qualification indicators

The rate of educational attainment, demographic changes, and the economic growth suggest that by 2020, there will be at least 40 million workers with tertiary education – 13% of the total demand. [151] Globally increasing tuition fees leave the majority of graduates in debt. [152] For example, in the UK tuition fees have risen by 100% only in 2012. [152] This gives rise to cheaper alternatives offering education close or equivalent to tertiary education. Non-academic degrees, or "Educational Certificates", are credentials awarded by non-accredited educational institutions. These are obtained by the completion of requirements for a study program, including coursework or other performance evaluations. [153] Typically, they are awarded for life (comparable to academic degrees), cannot be achieved within the scope of a short-term training (e.g. one day), and are commonly below baccalaureate level. However, an increasing amount of students are especially attracted by the affordability and accessibility of MOOC model certificates. Coursera and Udacity are two leading MOOC providers that even provide graduate-level courses. Udacity focuses on teaching critical industry skills in cooperation with leading industry employers. [154] Coursera offers academic multi-course specializations in conjunction with top ranking universities. [155] The considerably cheaper price and shorter time-frame have the potential to satisfy the growing skill gap.

Facts

- European labor market projections suggest that 35% of jobs will require a tertiary graduate-level education by 2020, while less than 30% aged 25-64 have attained that level in 2012 [157]
- In 2012, the American Council on Education's College Credit Recommendation Service (ACE CREDIT) started to evaluate the credit-worthiness of MOOCs; [158] In 2013 the first five Coursera courses were evaluated and given a recommendation for college credit by ACE CREDIT [159]
- Employers like Google already have teams with around 14% percent of members without college degrees [161].
- Challenge: Employers still rely on a bachelor's degree as recruitment filter [162] and do not primarily focus on the necessary skills for the job that could be fulfilled by alternative credentials.

Key Drivers

- Desire for individualized learning of focused skills within a shorter timeframe
- Fast-changing technologies and a high availability of knowledge require continuing education of employees to keep pace within the international competition
- Demand for employees with a specialized set of skills

Impact on the Future of Education

The increasing amount of and demand for alternative credentials, such as MOOCs or developer boot camp certificates, indicate an innovative movement in the educational sector. For the first time, high-quality tertiary educational content becomes accessible to a wide audience at an extremely fast-pace via the internet. The affordability enables the broad public to participate, and the increasing accessibility allows developing countries to utilize and capitalize on this development. Accredited institutions, such as universities, will need to embrace new degree and tuition models to stay attractive to young talents. The replacement of traditional academic degrees is unlikely. However, increasing acceptance through companies, which themselves run corporate universities and award certificates, can offer alternative modes for entering the working world or changing career paths.

Corporate Universities

Rise of corporate universities that focus on company-relevant knowledge and employee development

In the 1980s, leading corporations in the high technology and computer industry were confronted with high global competition. These corporations aimed to best prepare their employees with company-specific training in order to strengthen competiveness. [164] Therefore, they began to set up educational initiatives which they developed into corporate universities. [164] A corporate university can be defined as an educational formation that is designed to strategically assist its parent organization in reaching its mission. [164] In contrast to pure training departments [165] and traditional universities, [165] corporate universities enhance the company's ability to change. Two pioneering examples are the Motorola University and the General Electrics Crotonville, which were both set up in the U.S. [166] These educational initiatives aim to create employees who see themselves as change agents. [166] The development of corporate universities was supported as company-specific training and development was not provided by public universities' education. [165] Courses in corporate universities are designed in-house for the company's own employees. [165] Nowadays, the curriculum includes not only company-specific training, but is extended towards activities such as career planning, executive development courses and E-learning courses. [167] Companies profit from the continuous career progression paths fostered by a corporate university as they can serve as a suitable tool to retain high-potential graduates. [165]

Facts

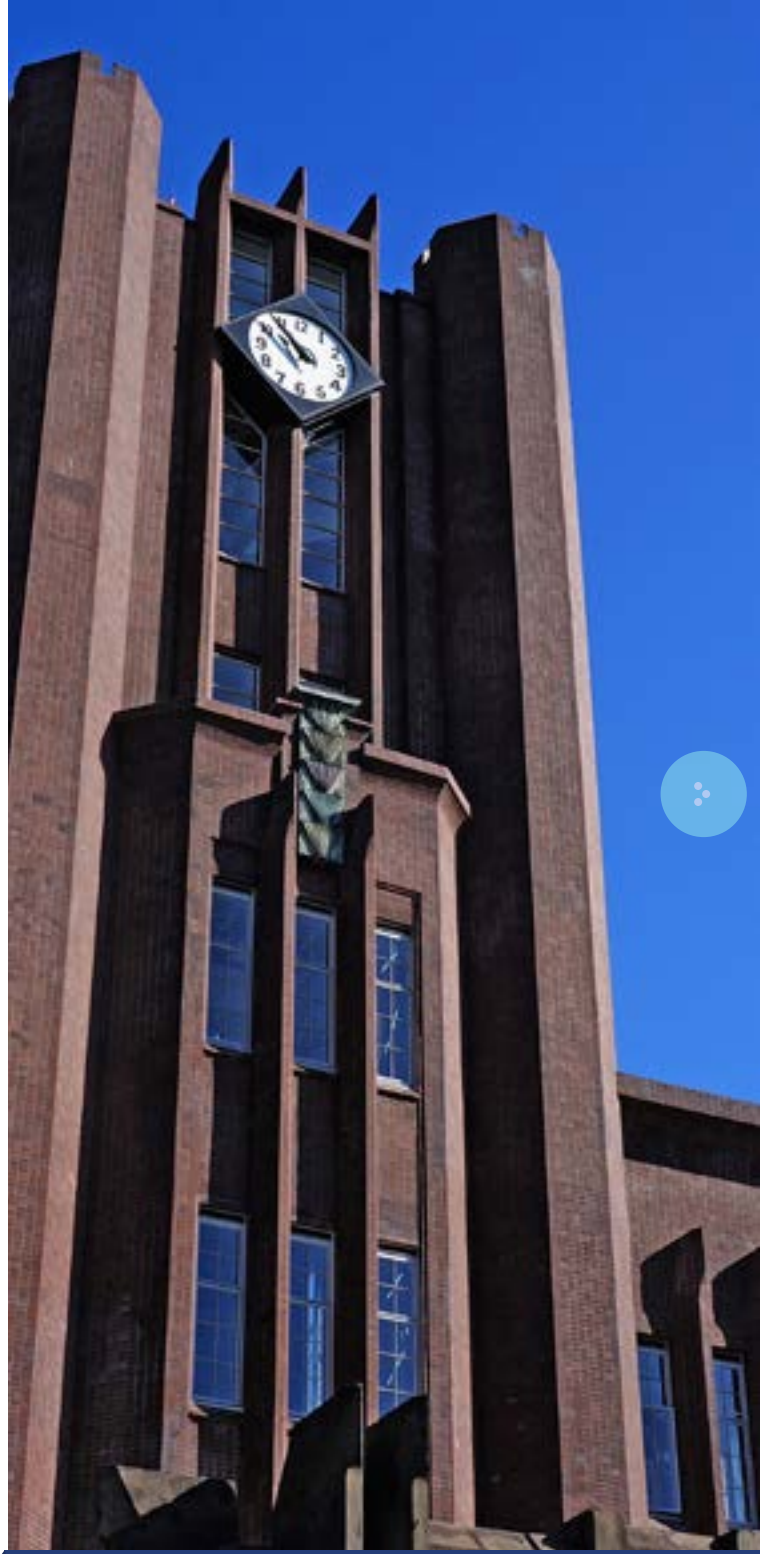
- In 1988, there have been 400 corporate universities worldwide. By the 1990s, this number increased to more than 2,000 and doubled again by 2010 [168]
- Companies with corporate universities outperform their competitors by 9% [168]
- As job satisfaction is highly related with training satisfaction, [169] employees who are offered development opportunities are more likely to stay loyal to a company
- Challenge: Measurement of the impact of educational courses on company's needs [170]

Key Drivers

- Sharing knowledge becomes increasingly important in a knowledge-based economy, facilitated by interdisciplinary sessions at corporate universities.
- Need of companies to keep up with the fast pace of global competition, requiring well-educated, specialized employees.
- Request for centralized resources within a corporate university to decrease expenses for educating employees.

Impact on the Future of Education

Corporate universities have experienced hype in the last decade and might continue to play a crucial role in the education process of corporations. In the nearer future, corporate universities might closely collaborate with traditional universities or other corporate universities in order to standardize their certification processes and make them comparable beyond organizational borders. With regards to the required criteria to achieve university status, it might be possible that corporate universities directly compete with public universities. [165] Consequently, students might start working earlier as they can gain further education in corporate universities rather than in traditional universities, and for far less cost. Moreover, the acquisition of certificates can serve as a career accelerator.



Knowledge Sharing among Employees

Increasing practice of spreading knowledge between individual employees

Knowledge sharing has been around in corporates for a long time in the form of apprenticeships. The importance of it has increased: the number of people starting apprenticeships in England increased from 175,000 in 2005 to 440,400 in 2013. In the upcoming knowledge economy (definition: "the centrality of theoretical knowledge as a source of innovation" [171]) the sharing of knowledge now functions time-independent due to Web 2.0 technologies like social learning or wikis [172] and knowledge is widely accessible. These technologies promote the actual exchange of knowledge between employees. A study on the performance of factories shows that over the last twenty years there has been a high correlation between success and knowledge sharing within the company. [173] An example is Toyota. They manage to obtain their strong market position by incentivizing knowledge acquisition and usage. [174] This shows that knowledge sharing [175] fosters organizational performance. [176] Ford, IBM and PWC [177] implemented a company-wide knowledge-sharing culture [178] to motivate employees to learn and share [179] by building on existing networks and redesigning them as knowledge-sharing platforms. Other corporations have tried to introduce certain routines like Corporate Universities to enable a regular knowledge exchange by having courses delivered from employees to employees (e.g. ProSiebenSat.1 [180]). [181]

Facts

- The sharing of knowledge is positively affected if the sharing process is structured by informal relations rather than formal hierarchical structures [182]
- Knowledge sharing cannot be limited to best practices but needs to have a wider focus on various types of knowledge [183]
- Knowledge sharing within the company among different departments is more likely to be observed in work groups consisting of members with different organizational affiliations, roles and positions because they can expose the group to unique sources of knowledge [184]
- Knowledge sharing behavior is affected by several factors like the collective capability of the group or the incentive policy of sharing knowledge [185]

Key Drivers

- The usage of Web 2.0 technologies like social networking, blogs or wikis [172] enables better and faster access to knowledge and internal experts [189]
- Sharing emerges in society and is valued as an important cultural value
- To stay ahead in global competition, companies need to use the company-specific knowledge they have and facilitate its sharing

Impact on the Future of Education

One decade ago, it was sufficient to be an expert in one field. However, in the future it will be essential to be integrated into an active network that fosters knowledge sharing within companies. This might imply that specialists are the sought after employees of the future as they can enrich an organizations internal knowledge network, bridge organizational interdependencies [183] and ensure that knowledge is always kept up to date. With regards to the internationality of the workforce, documenting existing knowledge will become crucial. The exchange of knowledge can happen via Web 2.0 technologies and in a time-independent way. On a very long-term perspective, knowledge-based systems could be built in a modular way from the knowledge which already exists. [190]

Employees as Soft-Skill Experts

Interpersonal skills gain importance and will be actively developed on the job

There is broad agreement among the top performing companies that employees with 'soft-skills' are important for future success. [191] Communication, collaboration and creativity [192] are identified as the most required competences of employees in the modern economy. [193] With the rise of collaborative structures in companies, interaction among people from different backgrounds and departments will be the key for innovations. [194] However, according to hiring managers, graduates today lack exactly these competences. [193] To close this gap, corporate training needs to shift focus towards the development of soft skills. [195] Studies have shown that it is more successful to learn soft skills on the job than in classrooms. [196] Consequently, new concepts arise, which integrate soft skill learning into the normal working routine: 3M, Google and Gore for example, successfully pursued the policy that up to 20% of employees' working time can be used for own projects. This approach, the so-called 'slacktime', not only boosts creativity and communication among employees, but also results in innovative products, like Post-its, Gmail and Gore-Tex. [197]

Facts

- A study among 1,541 CEOs identified creativity as No. 1 leadership competence in the future [198]
- 94% of hiring managers put a focus on creativity when selecting a candidate [193]
- Corporate Universities, e.g. Pixar University, offer improvisation classes, which are not directly linked to the core product of the companies, but increase creativity and communication among employees [199]
- Corporate mentoring is on the rise with 71% of all Fortune 500 companies offering mentoring programs for personal development purposes [200]
- Leadership development programs, which have a strong focus on interpersonal skills, have the highest share of corporate training budgets in the U.S. [201]

Key Drivers

- Increase of collaborative structures in companies raises the importance of communication and interpersonal skills [204]
- Through a higher level of collaboration among interdisciplinary departments, the ability of interdisciplinary communication gains importance
- Since product innovation is becoming the central factor for corporate success, the workforce needs creativity and the ability to innovate [193]

Impact on the Future of Education

Corporate education shifts from job specific to holistic education. Pure fact-based knowledge becomes less important on the job, since it can easily be accessed by technology. This focus on personal development additionally helps the company to attract and retain high-qualified employees, as they put an increasingly higher value on personal development programs. However, soft skills and the development of the personality will not only gain importance in corporate education, but also in the recruiting process: as applicants' skills and creativity will become more important in the recruiting process, universities will be likely to adapt their curriculums and try to teach the students the necessary soft skills.

Political and Legal Trends

Academic Collaboration between Countries

Exploitation of every young individual‘s potential

Data Protection and Privacy concerns

Incentives for Lifelong Learning

Standardizationof the Educational System

Political and Legal Trends

Political and legal structures form the building blocks and the boundaries of the education system of each country. Governments and especially their departments of education are responsible for setting regulations and improving existing ones. Depending on the ruling political party those regulations and thereby the educational framework can change. The framework can be shaped on a national and international level due to supranational organizations such as the European Union.
Emerging business models addressing the education market should first, comply with regional regulations and their respective laws and second, address future developments.
By comparing regional regulations and identifying a respective framework, the following trends indicate future developments in the education sector.

First, recent years have seen an increase in collaboration between different countries and international organizations. Driven by the interest of international exchange in a globalized world, initiatives like Erasmus+, the Fulbright scholarship program, the DAAD Germany and many other support programs have been established. Based on the amount of international collaboration initiatives, these inter-country cooperation efforts will increase.

Second, by analyzing past regulation levels, a standardization trend is noticeable. The education system evolved from a system in a microcosm to a system in a macrocosm. Formal education was taught independently in rural areas but is now taught on a global level with regard to the GMAT. Governments focus on unifying the education system on a national level and programs with international standards emerge. Education systems will become more homogenous and comparable. Companies will be capable of introducing their educational products and services to new regions and thereby realize economies of scale.

Third, Big Data and its application come into conflict with different perceptions of data protection and privacy rights. Data protection and privacy rights vary greatly among countries and thus require individual attention. With regard to collaboration and standardization efforts, some call for a global perception of data and privacy regulations and thus respective laws.

Furthermore, governments of developed countries are forced to encourage every young individual to participate in the education system due to demographic change and skills shortages. Special programs encourage minority groups to take part in the education system. The overall participation and the share of diversity in the education system will increase.

Finally, a global focus on lifelong learning fosters formal and informal learning to prepare pupils, students and professionals for future challenges. Lifelong learning initiatives help eliminating the barriers for adults to participate in a fast-changing environment and try to ensure quality on an ongoing basis.

Academic Collaboration between Countries

Increased strategic collaborations between different countries and regions encourages students and teachers to study and work in different places

With the increasingly complex nature and global scope of issues in present day, there has been an increased focus on international collaboration between countries to promote the education of students across the country, either with student exchange programs or through international full time degrees. The idea is to foster young individuals with a greater international awareness and a global approach to tackle today's world problems and eventually build a stronger work force in the country. Initiatives like Erasmus, 100k China, DAAD, and many other such alliances indicate an increase in inter-country collaboration. [206] [207] [208] [209] Because of the ease of regulations and standardization, professors are teaching in more than one university across different countries. Although the trend is fairly common and dominant in developed countries, developing countries are following suit, with recent collaborations like India-Singapore Higher Education Collaboration, Afghan-Pakistan Student exchange MoU, [210] German-Tunisian consultations. [208] These developments indicate an emerging focus on international academic relations between countries, and the importance governments and education stake holders place on this topic.

Facts

- Various scholarships and funding opportunities are provided by different countries and regions to encourage students to study abroad [211]. Erasmus, USAID, DAAD Germany, Netherlands Scholarship program, 100k China etc. [212] [206] [213] [207] [214] [209]
- Collaborations occur on intra-country and state level, to increase the efficiency of the educational system within the country [215]
- Cultural scholarships for socio-economic change provide opportunities for students to study abroad [216]
- Bologna process and other standardization of education facilitate the movement of students across countries and regions [217]

Key Drivers

- Global scope of problems/projects requiring broader international awareness
- Local workforce requirements in different countries
- Political motivation, enhancing the relation between countries

Impact on the Future of Education

The increasing collaboration between countries will help to increase the "brain gain" and circulation to mainly developed countries. [211] There will probably be a further increase in skilled individual movement across countries, and individuals participating in the work force in different countries. These policy changes by countries will allow greater international mobility of students and teachers and offer better employment and R&D opportunities with broader collaboration between partners and countries.

Exploitation of every young individual's potential

Encouraging as many young people as possible to take part in the education system

Throughout recent decades, the number of immigrants in developed countries has risen tremendously. As a consequence, governments have to establish new measures on how to integrate these immigrants. This development will increase in the near future due to an increase in general migration movements. [218] Immigrants form a growing minority group in developed countries. In order to ensure a base of educated citizens, governments encourage this minority group to take part in the education system. To some extent developed countries are dependent on integrating these immigrants due to demographic change and skills shortage.

Moreover, governments try to reintegrate disabled people in the education system. Confronted with social change and skills shortage, developed countries are forced to exploit every young person's potential. [219] During the last few years, several strategic initiatives and frameworks have been set up to offer equal access and further support. [213] [220] [221] For instance, there are more and more schools in Germany that emphasize the inclusion of disabled people into normal classes. However, this implies some challenges concerning financing. All in all, diversity and participation in the education system will increase.

Facts

- United States: At least one year of college or specialized training after high school for each student [213]
- European Union: Reducing the rate of leaving school early below 10 percent and offering education and training for social inclusion of minorities such as disabled people
- Finland: Potential of every individual should be maximized and free education is offered to encourage all young people participating [220]
- Challenge: Fostering education needs to be financed

Key Drivers

- Skill shortage: Need for many highly qualified and educated employees
- Increasing competition and collaboration with people all over the world
- Increasing minorities such as immigrants: Participation into the educational process used as inclusion and integration method
- Individualism: Emphasizing every individual and their development
- Basic right: Equal opportunities for everyone

Impact on the Future of Education

In the future, education will play an even more important role due to the educational access for all young people. The gaps between people from different backgrounds might narrow and the outcomes for all pupils and students could increase. By fostering educational excellence and ensuring equal access, the achievement of innovation and a further development of the society as a whole could be a potential outcome [221]. Additionally, higher cultural and social diversity is enhanced in the educational context. Finally, the way of educating people could be shaped by a more technological approach to ensure that every individual is reached.

Data Protection and Privacy concerns

Data security and privacy protection concerns are rising globally

The applications of Big Data are going to take off in the near future, as additional possibilities to collect further data from end users through mobile devices and wearable sensors emerge. [222] This potential impact on personal rights is raising a global voice for concrete regulations on data and privacy protection. Many people fear mass surveillance not only through the government and intelligence services but also through private companies or advertisement networks such as Google's AdMob. This movement is gaining momentum through the ever-increasing amount of cyber criminality that endangers private users' data [222]. As a result, politicians and lobbies are beginning to consider those issues on a daily basis, which will shape the upcoming market for digital education products and services.

This trend is even moving to a supranational level. A draft for a General Data Protection Regulation that would apply to entire Europe is already being worked on [223]. The importance of this topic is underlined by an annual data privacy conference. These facts increase the notion of impending political and thereby legal change in privacy regulations. Especially in Germany, privacy laws regarding students and pupils are very strict compared to those applying to private users. Both tightening and loosening those laws will greatly impact the digital education market in Germany.

Facts

- Introduction of positions such as "Data Protection Coordinator" or "Chief Privacy Officer" at several universities to deal with rising privacy concerns [224]
- Long-running incentives to unify data protection laws in Europe through the draft EU Data Protection Regulation (still in development as of March 2015) [223,222,225]
- Still no unification of laws or regulations across countries or even across different institutions within a country. Possible reason: varying perception of the right to privacy [226]
- Perception of privacy in the US is shifting from a passive right towards an active right ("right to self-information control") due to the rise of digital technologies which indicates impending changes in law [227]
- Massive and constant increase in cybercrime over the past decade is leading to new challenges [228]

Key Drivers

- New challenges emerging from cybercrime and cyber security increase fear
- Digitalization is finding its way into the classroom and education in general
- Increasing amount and spread of mobile devices leads to increased potential to harvest and abuse user data
- Increasing mass surveillance through drones, CCTV, etc.

Impact on the Future of Education

Laws and regulations vary greatly across different stages of education and sometimes even across different institutions. Thus, generalizing a business model to other education stages in the growing digital education market will be a challenge. Unfortunately, this gets even more difficult when trying to internationalize, since laws are not in the least unified across countries.
However the EU has already picked up this topic and is working on some sort of common line that is to be expected in the near to mid future. However, until this is realized quite some uncertainty regarding the legal situation is inevitable, which could potentially block innovation in the market. Another challenge can be getting into the market in the first place, since some countries, especially Germany, have long-standing laws in place that turn out to be quite harsh when interpreted in the "new" digital context.

Incentives for Lifelong Learning

Governmental incentives support ongoing learning opportunities, regardless of age and personal situation

The world population is growing rapidly and aging. Meanwhile, technological breakthroughs occur more frequently and bring constant changes to life. [229] Lifelong learning is a global initiative that fosters formal, non-formal and informal learning to prepare pupils, students and professionals for future challenges. [230] [231] [232] Lifelong learning initiatives mainly focus on lifting barriers for adults to participate in a fast-changing environment, ensuring the quality of learning and recognizing learning outcomes in society and work life. [233] [234]

The aim is to improve the quality in education at any age, offer new learning opportunities and to embrace differences in the learning process. [235] Lifelong learning promotes active citizenship and addresses topics such as social exclusion and learning with disabilities. [236] [237] It advocates the concept of learning in an informal setting and suggests that equitable distribution of skills across population has a strong positive impact on the overall economic performance. [238] Finally, the topic of lifelong learning has become a global trend that started through numerous incentives such as Comenius, Erasmus, Leonardo da Vinci, Grundtvig, IRA saving plan. [231] [239] [240]

Facts

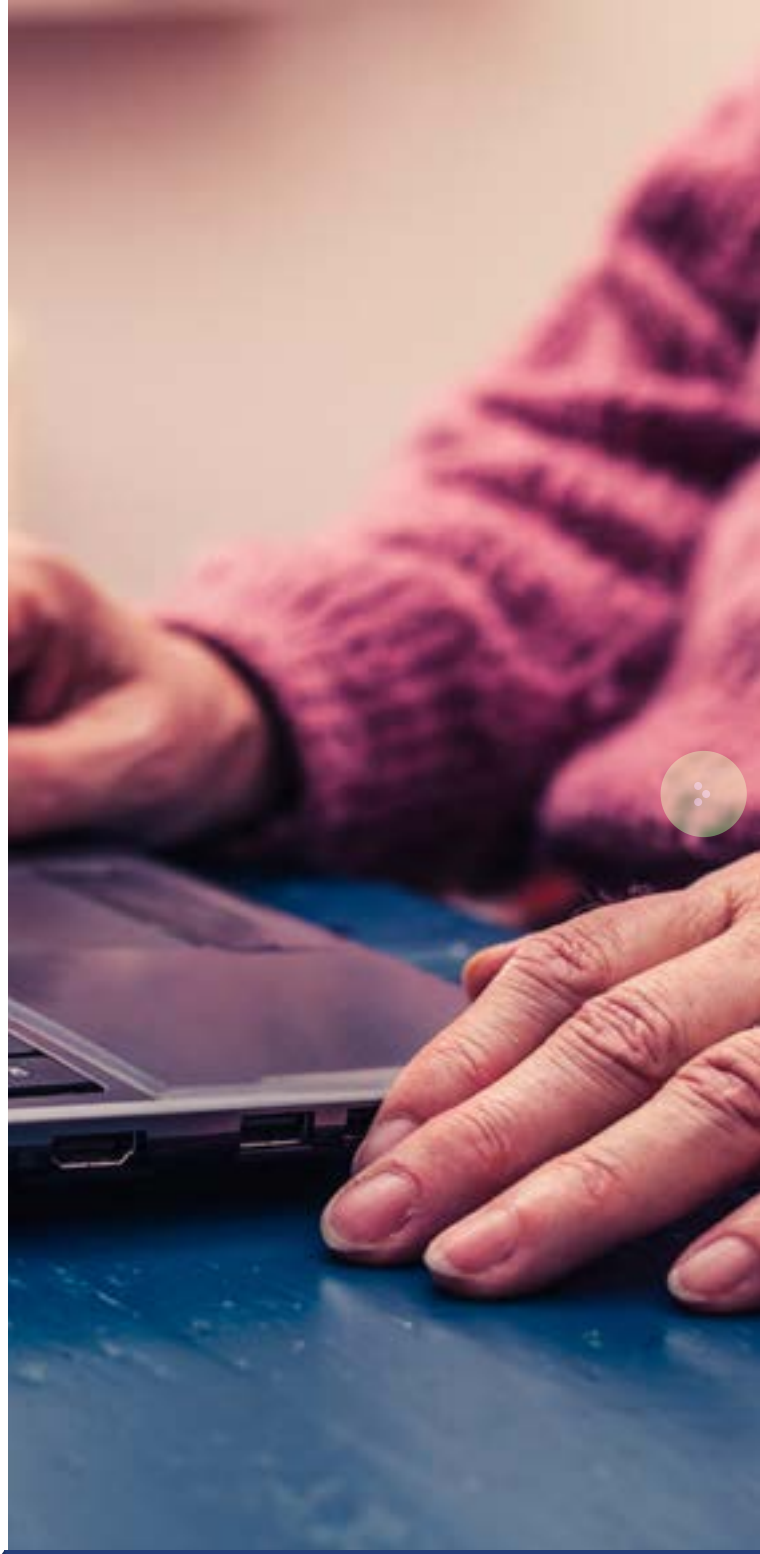
- Home education is a growing trend in many US regions and globally [241]
- Many schools are adapting Waldorf's integrated method of learning [242]
- Governments are rapidly investing in adult education [231] [243] [244]
- Continuing education is being accommodated by universities and companies worldwide [245] [246]
- Growing demands for knowledge work in all major industries [247] [248]
- Personal learning environments are bringing new benefits and challenges [235] [249]

Key Drivers

- Competitive labor market: ongoing development of individuals
- Aging population
- Increased technological presence in everyday life
- Intrinsic motivation to acquire new knowledge
- Individual learning habits and flexibility to adapt to changes

Impact on the Future of Education

Many schools are increasingly allowing the development of the student's full potential by alternative learning methods. Learning programs in schools are aiming to offer a rather more fun than stressful learning experience. Higher literacy among elderly people is being influenced by the simplification of the learning process. Governmental investments are being focused on emotional technology and promoting the accessibility of information. Systems for managing personal learning goals and evaluating learning outcomes are going to play an important role in curriculum planning. By fostering and supporting new learning opportunities, competitiveness in the labor market is going to increase.



Standardization of the Educational System

Increasing standardization efforts to unify the education system on a national and international level

Adults originally trained the young in knowledge and skills. [250] This informal type of training evolved over time into a formal education system. Education communities in rural areas emerged and thus, small education systems arose. Those small education systems in rural areas developed into urban systems in the nineteenth century. [251] Since then, urban systems have evolved into a federal state system to maintain individual features on a federal state level. Nowadays, the federal education approach has failed. Governments focus on unifying the education system on a national level to ensure educational consistency.

In Germany, there are still different regulations on a national level, e.g. for the transition from primary school to secondary school, different regulations for shifting from one class to the next or different prerequisites for final exams. [252]. On an international level, no standardized education system exists. However, there are similarities. Programs such as the International Baccalaureate and the European Socrates Erasmus Program facilitate international exchanges across nationwide education systems. [253] [254] Driven by globalization, a worldwide-standardized educational framework could evolve. Formal education standards, quality standards and a one common language – most likely English – would be essential building blocks.

Facts

- The standardization of the education system on a national level in Germany fails due to different education systems on a federal state level (e.g. different 'Zentralabitur') [252]
- The Bologna process is one outcome of the standardization process in Europe [255]
- European educational institutions only play an intermediary role between its Member States [256]
- The biggest initiative of the European educational institutions is the Erasmus program [257]
- The US struggles in defining its own standards and effective strategies for reaching international standards [258]
- Finland's education system could be taken as a role model for a nationally standardized education system [259]
- Challenge: rethinking the role of standardized skill assessment [259]

Key Drivers

- The same level of quality in education for all citizen
- Globalization - people will change their place of residence and flexible education systems will be required
- Stronger international comparison between pupils and students through a globalized labor market
- Transparent and more understandable education systems

Impact on the Future of Education

The standardization of the education system will allow pupils or students to adapt to the fast changing environment of a globalized world. It will become easier to switch between education systems. Due to standardized regulations, there will be no need to adapt educational products or services in the market to requirements in other regions. Therefore, educational products or services will reach more pupils or students and companies will be able to realize economies of scale. On the other hand, there is a danger of global monopolies if, for example, Google were to dominate the market. All in all, the education systems will be more homogenous and comparable. However, this raises the question of whether these homogenous systems will leave room for individuality.

Emerging Business Models

Emerging Monetization Strategies through Offering Talent Acquisition

Emerging Business Models based on Educational Marketplaces

Non-profit Business Models

EmergingBusiness Modelsrelated to Infrastructure Software

BusinessOpportunities arising from the Digitization of the Classroom

BusinessModelsenabled by Distributed Co-creation

Emerging Business Models

Business models are not only about generating revenue, but they define a set of value propositions provided by a company to a specific customer segment. This chapter discusses emerging business models in the field of education and what concepts they introduce regarding the various business model dimensions.

Firstly, the concept of online marketplaces is explained with the example of MOOCs and private tutoring. This trend is largely driven by the consumer-oriented trend of lifelong learning, introducing new suppliers and distribution channels for educational content. Hence, education is becoming more democratic because everyone is now able to access content such as lectures from Ivy League universities and one can now share and potentially monetize his or her knowledge on a specific topic.

Secondly, emerging monetization possibilities through offering talent acquisition are being examined. Related business models revolve around the concept of recruiting by connecting employers with potential talents, based on the growing skills gap that increases the competition between employers when searching for talented employees.

Thirdly, non-profit business models are mentioned. Their primary mission is to provide free education to everyone especially in developing countries. The major revenue stream consists of donations, and the major impact is democratization of education.

Fourthly, we analyze emerging business models related to infrastructure software and the way the software as a service (SaaS) concept is used in education. These models are becoming popular due to the steep growth of the E-Learning market, which is based on scalable software products.

Subsequently, new business opportunities arising from the digitalization of the classroom are examined. Penetration of new technologies such as smart boards, handheld devices and the reduced cost of hardware have allowed for new market opportunities. This trend has brought up a controversial issue about the potential effects of technology on students.

Finally, the chapter comes to an end by highlighting business models enabled by distributed co-creation. Monetization of the learning content respectively the learning outcome opens up new revenue streams for companies and universities. Currently the idea of an education that pays for itself is only seen in language learning, but it could spread to other fields of education in the future.

Emerging Monetization Strategies through Offering Talent Acquisition

Corporations invest in education in return for recruiting possibilities

Independent of traditional schools and universities, new commercial education providers are emerging online. In addition to the actual learning content, these platforms also serve as a touch point between students and potential employees. In this regard, three different opportunities of monetization have emerged: firstly, selling advertisement to companies for the purpose of employer branding (e.g. qLearning); [260] Secondly, direct recruiting through connecting corporations with talents that fulfill their exact requirements; [261] Finally, partnering with companies to train potential future employees, e.g. with companies financially supporting educational programs (e.g. master's degree in computer science offered by MOOC provider Udacity, Georgia Institute of Technology and AT&T, with the latter subsidizing the program's first year with $2m). [262] Also, it can be noted companies actively contribute to the education process. For example, Google and Instagram partner with Coursera to provide fee-based capstones to the MOOC provider's multi-course specialization series. [263]

Facts

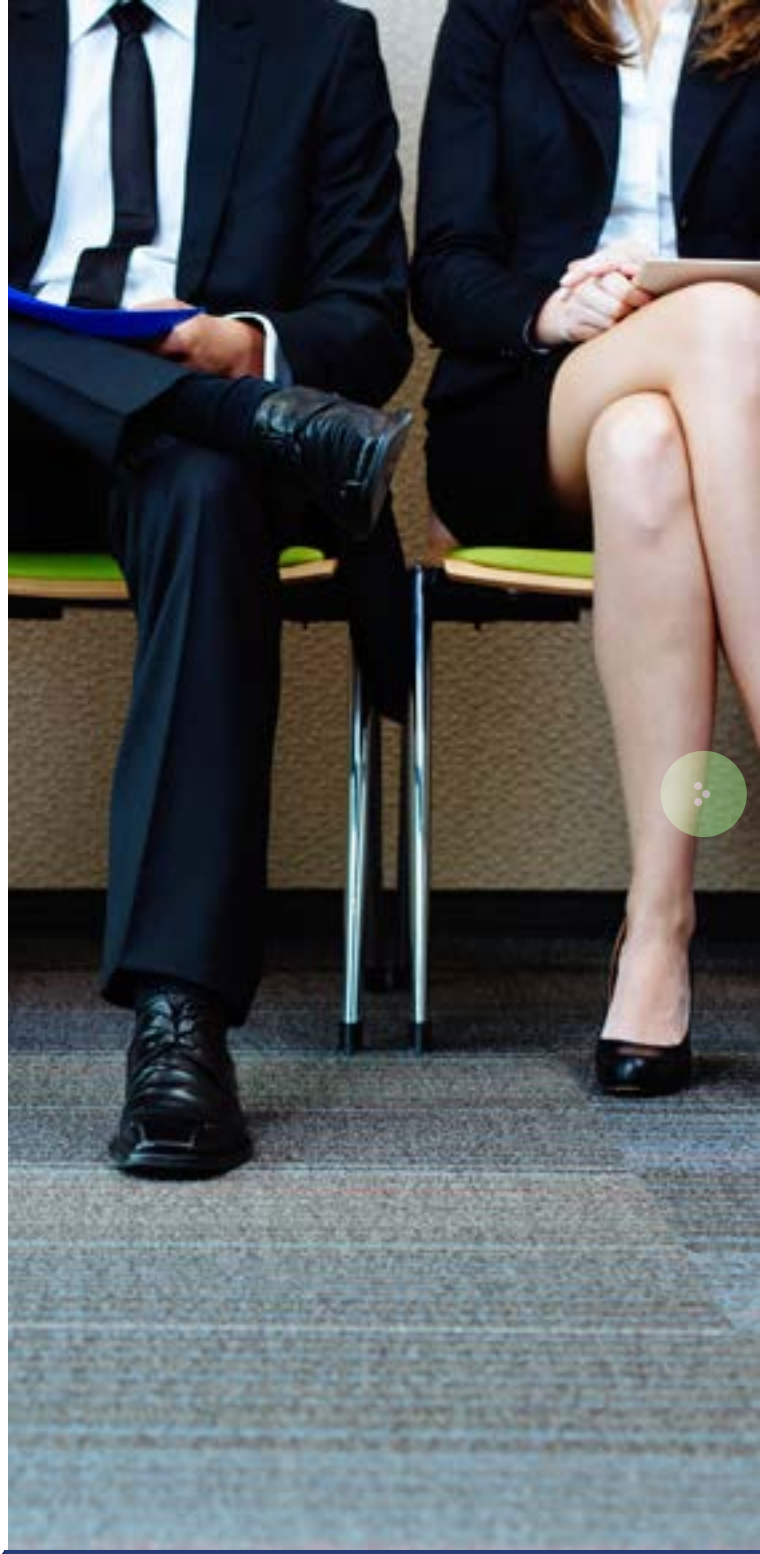
- Survey conducted by RTI International in cooperation with Duke University showing that 57% of all employers surveyed reported that they could see their company using MOOCs for recruitment purposes; [264] see figure 1
- Through employer partnerships with over 412 companies, Udacity's Career Placement Service connects students with companies worldwide, e.g. Google and Facebook [265]
- Possibility of lower tuition fees because of financial support through companies
- Higher appeal of online courses supported and approved by attractive employers (e.g. capstones branded by companies like Google will make the purchase of certificates of completion more attractive to Coursera students) [263]
- Challenge: privacy concerns in case of student performance in courses (e.g. MOOCs) being revealed to companies
- Recruiting companies emerging as new education providers to close the skills gap, e.g. Aquent which creates a curriculum of free MOOCs in partnership with corporate clients [268]

Key Drivers

- Growing competition for skilled talents among corporations and hence increasing need for employer branding and recruiting activities [269]
- Low willingness to pay for education in countries where education is traditionally free leads to need for monetization through other channels

Impact on the Future of Education

With new paying stakeholders in education, the amount of free and affordable educational content will grow further. This contributes to the democratization of education, i.e. the accessibility of learning content for everyone. Another consequence is, however, that corporations will increasingly influence education and can thus recruit employees who fulfill their exact requirements. [270] On the one hand, this might lead to a higher student motivation due to better career opportunities. On the other hand, students might focus too much on employers' demands instead of their own interests, and the independence of education could be threatened through growing industry influence. Also the fact that students focus more on hands-on, industry-related programs will be a potential threat for traditional educational institutions.



Emerging Business Models based on Educational Marketplaces

MOOCs and peer-to-peer platforms are taking off [271]

Online marketplaces are virtual platforms bringing together content creators/sellers and buyers of goods and services. The company which provides the platform plays an intermediary role and generally obtains revenue from commissions derived from transactions. [272] In the last few years, two major kinds of marketplaces have appeared in the educational sector: marketplaces for MOOCs and marketplaces for private tutoring.

Regarding marketplaces for MOOCs, several commercial start-ups such as Coursera and Udacity have appeared on the market in 2012, offering MOOCs from prestigious universities on their platforms. [273] These traditional universities engaged mainly to expand their marketing activities and to develop a new revenue stream. [273] Most of these platforms, however, struggled to monetize their MOOCs. [274] In contrast to these companies that are collaborating with universities, peer-to-peer platforms that enable anyone with knowledge to become a teacher, are gaining great attention at the moment. An example is Udemy, which raised $32m [275] in 2014 and is considered as one of the companies shaping the educational sector in the near future. [276]

Regarding marketplaces for private tutoring, platforms for both online as well as offline tutoring services are increasingly appearing on the market, e.g. InstaEdu. [277] This global market for tutoring is estimated at $103bn by 2018 [278] and at $193bn by 2020 [279] reflecting the potential for online tutoring platforms. Besides these two major kinds of marketplaces, other marketplaces in the educational area such as marketplaces for ebooks (e.g. Packback) and marketplaces for language courses (e.g. Glovico) are emerging on the market.

Facts

- Despite the global E-learning market estimation of $107bn in 2015, [273] some platforms struggled to monetize their MOOCs [274]. Therefore, some of them started to charge for nanodegrees or entered the corporate training segment, where the willingness to pay is higher [280]
- More MOOC platforms focus on specific fields of education such as Codecademy's focus on Computer Science.

Key Drivers

- Decreasing costs for information and communication technology (ICT) as well as rising global internet penetration increases the market for educational marketplaces [281]
- Trend of lifelong learning for private or professional reasons increases the demand for educational marketplaces
- The supply on peer-to-peer platforms grows due to the Share Economy phenomenon and thus the increased willingness of people to share their knowledge and skills with others [281]
- Increasing desire for academic excellence and reduction of staff at schools and universities increases demand for private tutoring [279]

Impact on the Future of Education

The increased availability of high quality knowledge through marketplaces on the web will change the roles of the established educational institutions as knowledge-keepers. These platforms make it possible for anyone to access education 24/7, regardless of his or her origin and location. In the future, the amount of knowledge generated by peers will increase due to the growing number of peer-to-peer platforms. The platforms also enhance the possibility to learn anything everywhere from anybody. This means that nowadays your teacher could be your neighbor with a specific knowledge in a certain area or he or she could be a Harvard professor.

Non-profit Business Models

Educational missions funded by donations

Besides monetization opportunities in the education sector, an altruistic movement to eliminate barriers to knowledge and provide learning materials to anyone for free has evolved. Individuals and organizations are donating and funding projects despite receiving no financial benefit in exchange. These philanthropic donors increasingly supply donation-based funding for non-profit organizations to support their educational missions. A non-profit organization uses its revenue to foster its mission, rather than allocating surplus income amongst shareholders. Donations for education have been on the rise since 2010. US citizens donated $52.07bn to the education sector in 2013. This number indicates an 8.9 % rise since 2012. In the US, between 2009 and 2013, education-related philanthropy increased by an estimated 37.3 % to $52.07bn. [282] One example of a top university-backed non-profit MOOC platform is edX, founded by Massachusetts Institute of Technology and Harvard University with $60m of resources donated by the two institutions. Khan Academy, another prominent free online learning platform, is a not-for-profit educational association with support from the Bill & Melinda Gates Foundation and Google.

Facts

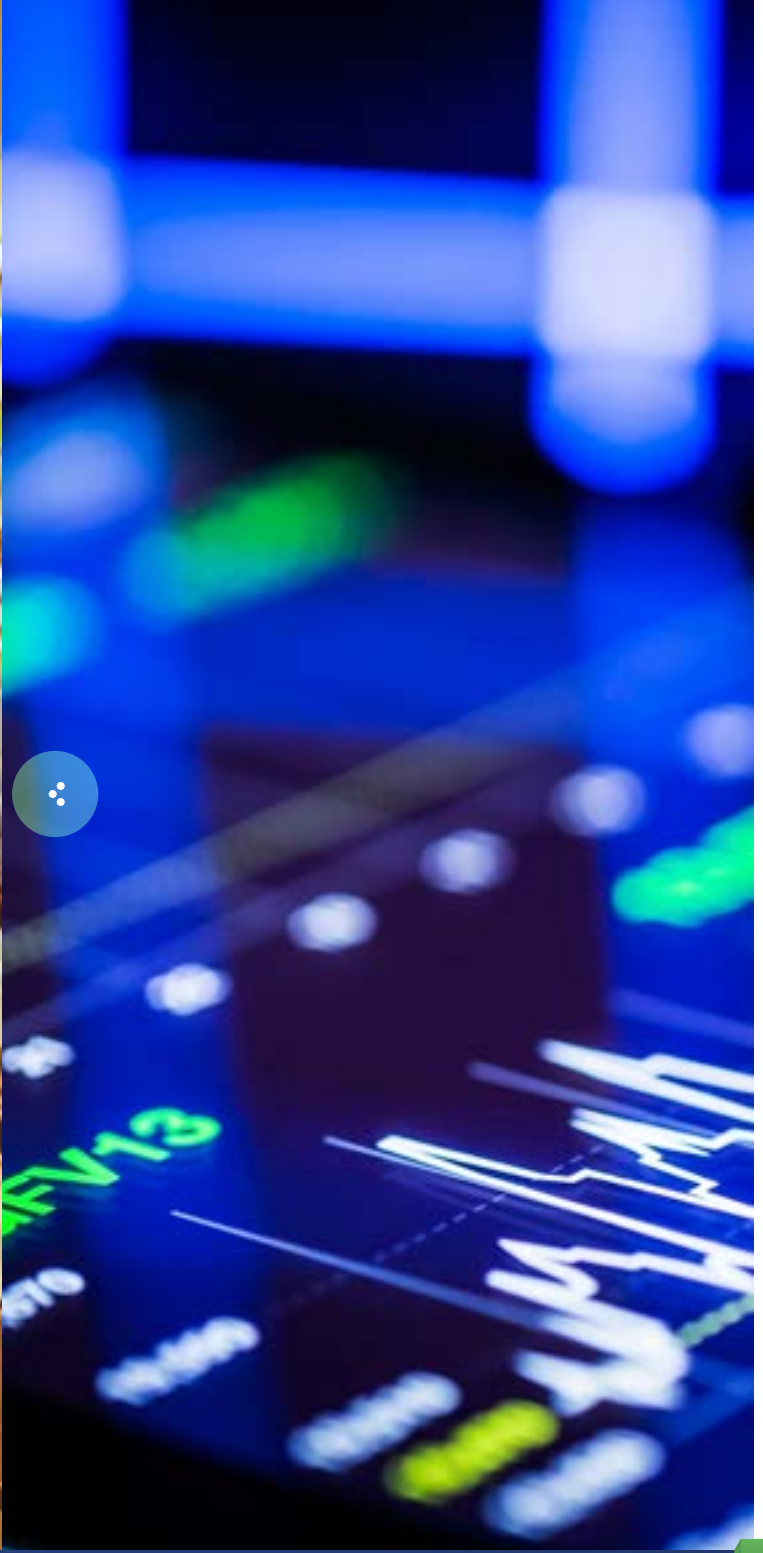
- Challenge:The type and motivation of a donor might bias the mission and operations of the non-profit [283]
- Challenge: Philanthropists often struggle to understand the impact and limitations of their donations [284]
- Non-profit MOOCs enable an organization to supply broad access to education, they allow for experimentation with learning materials and foster organizational recognition [285]
- Most MOOC start-ups do not have well-defined business models; like many technology start-ups, they try to grow fast and care about revenue streams at a later stage [285]
- Challenge: identifying the economic engine of a non-profit organization [283]: a need to understand donor and recipient value proposition [286]

Key Drivers

- The access to philanthropic sources, which is improved by information transparency regarding the utilization of donations [287]
- Non-profit status is honored in the society [288], e.g. tax exemptions for donations
- Non-profits are trusted more than for-profit organizations in the education sector [288]
- Advances in technology and growing ICT penetration promote global access to information for everyone. Likewise, these developments lower the barriers to market entry and to innovation for organizations [284]

Impact on the Future of Education

Increasing amounts of donation based funding paired with cost savings, increased efficiency, and improved communication through technology advances, enable educational organizations to make education accessible for everyone anywhere for free. Donations to education promote a global economy with rising learning opportunities beyond institutional walls and supply people around the world with contemporary learning materials. This democratization of education has the potential to promote global education equality.



Emerging Business Models related to Infrastructure Software

Providing specialized infrastructure solutions to the educational sector in the form of software and software as a service

Education providers need appropriate software solutions to publish, manage and monetize their learning content online. Also, specialized management and communication platforms are required for internal administration purposes. These functions can be realized in single products or can be combined in a so-called Learning Management Systems (LMS).

This software is mostly purchased from external suppliers. Hereby, two distribution models are commonly used. Firstly, a license for software is sold for a one-time fee. Customers are then able to run it on their own computer systems. Secondly, the software is sold as a service (SaaS) with a usage based payment. For this, it is running on the cloud of the software provider and no administration effort or hardware is necessary for the education provider. This is especially valuable for schools and other educational institutions. [289]

The market of LMS has been growing with a Compound Annual Growth Rate (CAGR) of 11.7% from 2009 to 2012. [290] Moreover, a number of acquisitions by relevant market players, and recent venture capital funding of software start-ups reflects the potential of this market. For the future, a CAGR of 25.2% from 2013 to $7.83bn in 2018 is expected. [291]

Facts

- Relevant VC Fundings include.: Desire2Learn ($80m, 2012), [290] rSmart ($10.8m, 2012) , [290] 2U ($26m, 2012), [292] Knewton ($51m, 2013), [293] Patience ($10m, 2014), [294] Kaltura ($47m, 2014) [295]
- Relevant Acquisitions include: Kenexa acquired by IBM, ($1.3bn, 2012) SuccessFactors acquired by SAP, ($3.8bn 2012) Blackboard acquired by Providence Equity ($1.9bn, 2011) [290]
- Challenge: Through software in education, very sensitive and critical data is generated based on the behavior of the learner.
- Challenge: High Market entry barriers exist due to high switching costs and possible supplier lock-in situations

Key Drivers

- The commercial E-Learning market is growing fast: Decebo forecasts a CAGR of 7.9% until 2016 to $51bn. [296]
- Besides being content-based, market advantages in a globalized E-Learning market are mainly created by innovative software products
- Process optimizations and a need for additional financial resources in established educational institutions require sophisticated management tools and content distribution systems
- In particular, the demand for infrastructure software as a service is mainly driven by its scalability, [297] which is attractive for potential customers

Impact on the Future of Education

Due to almost completely variable costs of software (as-a-service) solutions, [297] highly sophisticated tools are even affordable for small educational institutions. Two types of changes result from this. Firstly, new, small, and specialized education providers can evolve, which leads to decentralization and democratization of the education market. Secondly, established teaching institutions (including companies) can easily integrate content distribution systems, management systems and other infrastructure services. When used internally, this can lead to an optimization of the learning environment by reducing management overhead and better support for the teaching process. When used for external purposes, established institutions can provide available content to a broader mass of people and thus monetize it.

Business Opportunities arising from the Digitization of the Classroom

Providing technical solutions to enrich the classroom learning experience

An Internet connection and projectors have become standard equipment in educational environments. Besides this, both mass-market consumer and specialized educational technology is increasingly used in classrooms in the form of hardware and software systems.

Big market players like Apple, Microsoft, and Google, are trying to place their mass-market consumer computing products for the use in education to reach a new market and profit from a potential lock-in effect regarding both educational institutions and students. Therefore the usage of technology such as tablet computers highly increased in the last years. Until 2013, Apple sold about eight million iPads to the educational sector [298].

Based on this distribution of tablets in schools, a new market for software and digital interactive content arises, which is adapted to the new possibilities. Examples include Labster, onlineTed and GlobeHistory. Also, other hardware products like 3D printers or virtual reality products will create a market for educational content and software in the future. The revenue is usually generated by selling hardware, software or content directly to schools, parents or students.

Facts

- High obsolescence (short life time) of high-tech products. For instance the average economic lifetime of mobile computers is 3 years [299]
- Low market entry barriers for software and content products due to the availability of easy-to-use tools and sales infrastructure, e.g. Apple Xcode, iBook Author, and the App Store
- Challenge: High market entry barriers for hardware products exist due to scale effects in production and high switching costs for users because of lock-in situations, which are created by upfront investments in hardware and follow up software purchases
- Challenge: Regional, legal regulations and peculiarities in the field of education require specialized products, e.g. Bavaria's privacy law for schools only allows to use external services if they are conform to several security norms [300]

Key Drivers

- Decreasing hardware costs makes tablet computers affordable and available for a broader mass
- Established educational institutions are under pressure to keep up with innovative teaching methods
- Upcoming technology, which is integrated in the classroom, e.g. 3D printers or virtual reality products will generate a market for content and software

Impact on the Future of Education

The effect of the digitalization of classrooms on the learners is discussed controversially. On the one hand, people fear the negative impact of technology. For instance, some people predict distraction by the wide range of possibilities of tools including gaming and socializing features, or an increase in superficial competencies. [301] On the other hand, digitalization is expected to raise students' engagement and creativity. Generally, it is expected to promote a relevant change in education by enabling many innovative teaching concepts and learning methodologies, possibly leading to a better learning outcome. Also it is seen as an important part of education that people know how to use technology effectively and responsibly. But the question of social equality has to be answered, because the high costs of technology products have to be mostly covered by the students.

Business Models enabled by Distributed Co-creation

Monetization of the educational output developed by the students

In the past, permanently employed experts developed products. Driven by a perpetual pressure for innovation, companies have recently started to adopt Distributed Co-Creation (DCC) to find new unique ideas. DCC is the collaboration of multiple entities to produce the final product.

There are major two types of DCC in educational business models: firstly, monetization of the learning outcome co-created by the students. The students generate the revenue stream themselves while learning. Duolingo [302] is the prime example, with students translating texts from sites such as CNN & Buzzfeed while learning new languages. Therefore, revenue for Duolingo is generated. UC-Crowd [303] is another example. There, students collaborate with companies and institutes to develop new ideas. In the end, companies can monetize the outcome in exchange for providing an adequate funding to facilitate the learning process. A second monetization method based on student co-creation is to sell the content co-created by students and pay them in return for the content. qLearning [304] is an example of such an approach because students co-create the learning content which is sold afterwards by the company. DCC in education keeps growing with time. For example, Duolingo obtained a Series A $3.3M funding to a series C $20M funding. [305]

Facts

- Students generate content cheaper than professional experts [306]
- DCC survival depends mainly on students‘ enjoyment and the gained educational benefit
- DCC is suitable for small projects that do not require a lot of funding or highly professional experts
- Challenge: managing distributed co-creators is difficult
- Challenge: content is developed by students and not by professional experts
- Challenge: co-created content can be compromised by co-creators, leading to possible IP conflict

Key Drivers

- Business competition: companies always tend to venture for unique ideas
- Education that pays for itself: universities utilize DCC to fund their research and projects
- Hands-on experience: interactive learning environment increases students‘ motivation.
- Possible financial incentives: paying the students for the generated content [306]
- Emerging technologies such as Big Data & Data Storage Systems enable large-scale online DCC

Impact on the Future of Education

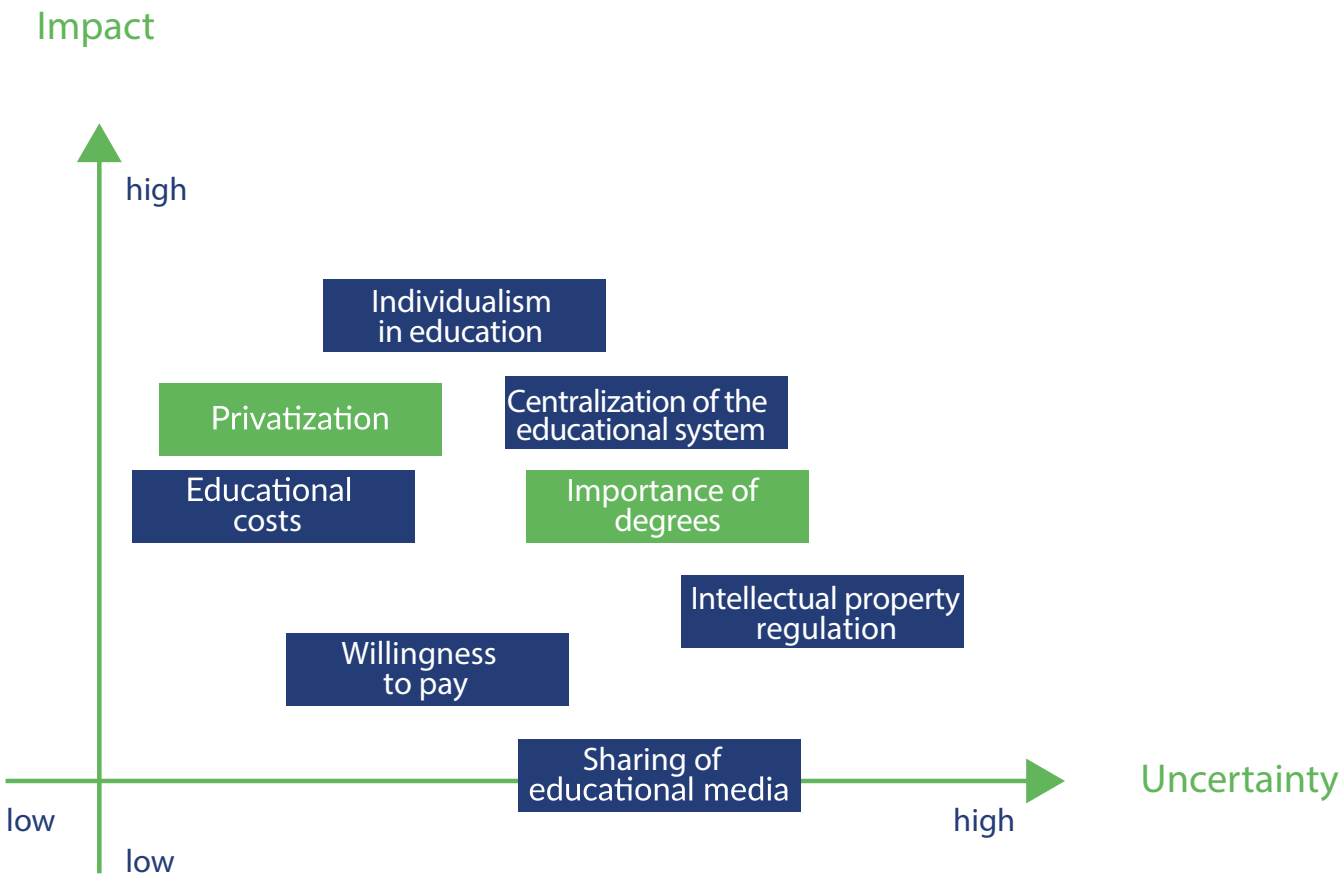
In the future, the idea of education that pays for itself might be transferred to other fields such as computer science, with students fixing software bugs while learning how to code. Also, DCC allows for a continuous dynamic learning content, as universities try to attract new companies by coping with the latest technologies and educational fields. It prepares future employees by reducing the gap between education and industry. Furthermore, it increases the students‘ motivation since they participate in real world situations.

Scenarios

The following chapter describes four scenarios of different futures. The chosen scenarios are plausible, relevant and of consequence for the user's decision, challenging, internally consistent, and recognizable from the signals of the present and near future. All four scenarios described below are equally plausible, but with regards to two key drivers, extreme visions of how education might look like in the year 2035. Stories of personae experiencing a day in 2035 are used to envision the scenarios. Signposts (often described as weak signals) that indicate a development towards each scenario are identified in order to describe a possible path from the present to each of the four extreme futures.

An exhaustive description can be found in the Chapter Methodology.

Driver Matrix



The scenario building phase follows a structured approach. Based on the research from the Basic Phase of the Trend Seminar, current challenges and drivers for the future development of education are identified. Drivers are forces that shape the future of education and that are usually exogenous to an organization. All identified drivers are modeled with bipolar extreme outcomes. In order to create four equally plausible scenarios, two key drivers are combined in a scenario matrix (see). The key drivers are characterized by a high impact on the future of education and a high degree of uncertainty (i.e. it is impossible to assign probabilities to their respective outcomes). Furthermore, the key drivers are independent from each other and do not overlap.

In order to select the most suitable key drivers, all drivers are ranked in a matrix according to their respective impact and degree of uncertainty. Different combinations of potential key drivers are then compared and the best combination of key drivers is chosen.

Key Drivers

Extreme outcome: Total public ownership

This extreme outcome describes education as a public good. Thus, all individuals have access to education and no individual excludes another individual by receiving education. Moreover, there exists no rivalry between educational institutions. Education is provided by governmental institutions that offer education to all citizens regardless of the age or financial background of a citizen. Governments spend a large amount of their federal budget on education. So that educational goods and services are free. Finally, quality standards in education, intellectual property and data privacy regulations are globally unified in order to provide an educational framework that represents the common educational interests of the general public.

← Privatization →

Privatization mainly refers to the act of contracting out local public services to private providers. A governmental institution may contract with a private company to manage its transport system, to keep public places clean or to run educational institutions. Therefore, the ownership of public resources shifts. One main argument for doing so is the fact that the government saves local governments money. In the 1990's and the millennium public educational institutions were markedly contracted out to private providers . This growth of the private provision of public educational services has stimulated a discussion on the wisdom of contracting by the government. Citizens are usually not involved in the act of contracting out. Thus, the government decides whom to assign the responsibility for education. Finally, this action implies a certain degree of unfairness and disregard of the public opinion.

Extreme outcome: Total privatization

Defined as "purely private markets" [346], this extreme outcome depicts that education will turn out to be totally private, offered by companies and institutions. Governmental contribution and interference in education will completely vanish. Economically, governments will use this movement to reduce the burden on their budgets and allocate the money saved to other fields. Driven by privatization, tuition fees will rapidly increase, also pushing students' willingness to pay. Companies and institutions will adopt their own educational quality standards. The social gap will increase as education will not be equally accessible by students with different financial backgrounds. Educational companies will impose a wide range of intellectual property and data privacy regulations due to the increased competition between private entities.

Extreme outcome: Degrees don't matter

In an economy and society where an educational certificate, including a traditional university degree, is of no value by itself, employability will instead only depend on acquired skills. These can be obtained through a virtual or physical educational provider, work experience, or autodidactic methods. Corporations will generally consider everyone and test them for required skills, call references, or rely on endorsements. This will enable a new market for companies providing external assessment services to corporations with unique metrics for evaluation and ranking workers by skills. Educational institutes will increasingly focus on providing courses delivering a unique set of skills, making their program of study the most favorable to students. Increased competition leads to a growing range of study programs at all price levels.

← Importance of degrees →

Degrees are currently the primary prerequisites for jobs that require skilled workers with tertiary education. International standards regarding degrees enable employers and institutions to quickly classify applicants. New technologies have led to the emergence of novel educational concepts which challenge traditional educational institutions. Furthermore, degrees are often only considered sufficient proof of qualification for career entrants. Later on, work experience, practical qualifications, and the personal network are determining factors for employability. Due to admission criteria and tuition fees, university degrees are not available for the entire population and lead to societal discrimination. If these qualifications could be obtained through other educational channels, traditional degrees might lose importance in the future.

Extreme Outcome: Jobs only accessible with accredited degrees

In order to systematically evaluate the employability of applicants, corporations start to rely on degrees as sole prerequisite. Hereby, the requirement is not based on whether a degree fully represents the required skill set for the job, or is even necessary at all. As degrees are typically accredited through quality assurance agencies, they offer a general comparability. Since companies rely only on accredited college degrees to verify employability of an applicant, they will not consider candidates with alternative credentials, or sufficient skills through experience, for a vacant positions. This development could also affect positions which did not require a college degree in the past. As a result, society and industry only value standardized full time degree programs.

Other drivers with high impact and a high degree of uncertainty

No willingness to pay

People are not willing to pay for education and want it to be completely free.

Willingness to pay

High willingness to pay

People are willing to pay for education as they believe anything that holds certain quality comes with a price.

Custom-made education

Learning material is altered and moulded to cater for different individual needs based on skill sets, learning pace, etc.

Individualism in education

Standardized, one size fits all

A single learning system is built for all students irrespective of their skill sets, talents or need for further assistance.

Complete resource sharing

All literature, media and learning material will be shared between everyone, leading to reliable, up to date resources and mutual benefit.

Sharing of educational media

No resource sharing

Individuals will not share their learning material, it is a 'every man for himself' culture.

Free

Education is free for everyone.

Educational costs

Extremely high costs

Education is highly expensive and unaffordable.

Centralized

All teaching methodologies, testing systems and results will be regulated by a single centralized institution or government body.

Centralization of educational system

Decentralized

Testing, learning and teaching media will all be collected, controlled and regulated by the individual institutions.

Open source education

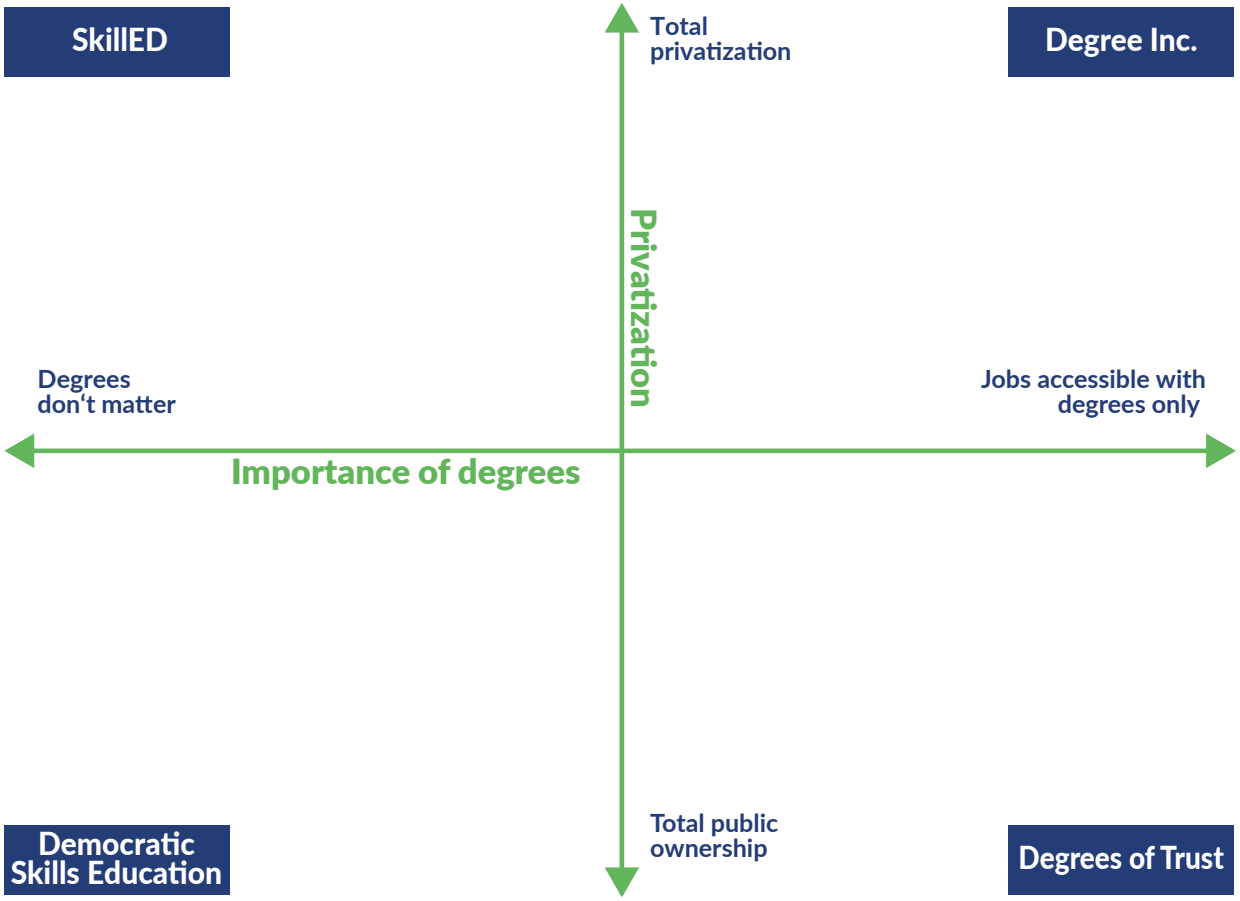
All educational content is freely available and can be copied and distributed.

Intellectual property regulation

No free sharing of educational content

All educational content is to be licensed.

Scenario Matrix



The two key drivers and their outcomes create the scenario matrix. Each key driver represents one of the axes, with the bipolar outcomes on both ends. All four scenarios are based on extreme outcomes of both key drivers. Plausible and consistent outcomes of other important drivers are included in each of the scenarios, but not taken to an extreme.

"Degree Inc." describes a fully privatized education system where degrees are the only relevant hiring criterion on the job market. "Degrees of Trust" describes a world in which the importance of degrees is the same as in "Degree Inc.", but the entire education system is in public hands. "Democratic Skills Education" is a future with a purely public education system without any importance of degrees. Accordingly, "SkillED" describes a future with a fully privatized education system without any importance of degrees as we know them.

Benedikt Brandner, Alexander Holzer, Stephanie Korbely, Annika Kreil, Asif Nadeem, Maximilian Strobel

Democratic Skills Education

A day in 2035

RING RING. RING RING. The sound of the alarm is relentless. "It's too early … It's cold and dark outside … Only one more hour of sleep please …", Susan thinks while reaching for her cushion to suppress the annoying sound. Suddenly, however, an artificial, soothing voice speaks to her: "Just relax, Susan. Your ideal amount of sleep is expected to be reached in one hour and 45 minutes." Thank God, the sound of the alarm clock was just a dream, and the sleep control unit built in to her mattress reminded her of that. "What a relief", Susan thinks, and is still happy about the abolition of compulsory attendance in schools eight years ago, in 2027. Since then, she has only had to go to school mandatorily once a week – which comes in handy for her, because her family lives in a rural area and her educational institution is located 30 kilometers away.

At 9 am, Susan and her twin brother Tom, who are both 19 years old, have reached their perfect amount of sleep and are ready to start their classes. Susan logs on to her Homelearning Station, which every student gets for free from the European Central Department of Education. Indecisively, she browses through the courses she had previously selected. Susan decides to start the day with the "Introduction to Quantum Mechanics", because she wants to get the necessary skills for an internship at SpaceX, the biggest aerospace manufacturer. Meanwhile, Tom begins the day going through the synopsis of his Italian cooking class, because he has his final assessment this afternoon. To prepare for the assessment he goes straight to his "Advanced class in Italian Cooking", originally conceived by a renowned Italian chef in Rome, and watches the MOOC providing a summary of the course content. Tom aims to pursue a career in public relations management, but he likes cooking so much that he wants to improve his skills in Italian cooking.

While Tom is trying to memorize the perfect mixture of pasta spices, Susan trains her skills in a tutorial where she has to solve exercises. As she is struggling with a particular quantum mechanics problem, she calls Harry, her personal Virtual Teaching Assistant, for help. He appears as a hologram next to her to help her with her current task: "Hello, how can I help you?". After her question was answered, Susan remembers the introduction of these Virtual Teaching Assistants through the European Central Department of Education, six years ago. Thanks to massive progress in machine learning, every student can have individual virtual assistance and tutoring during learning – regardless of social status or income. Since all of education is organized publicly, social equality in education has advanced a lot. In Susan's opinion, this is a really good thing – her friend Lilly who is currently acquiring the skills to become a doctor, probably couldn't have done so in the past, because her parents, both supermarket clerks, could not have afforded tuition fees as they existed in the past.

Today, however, education is free, and Susan appreciates this a lot.

In the afternoon, Tom and Susan go to the Education Lab – presence is today mandatory for both, because Tom will be assessed regarding his Italian cooking class and Susan will gather with her fellow quantum mechanics students for a collaborative project. Tom uses the travel time for some last minute studying on the go with his portable Homelearning Station. At the Education Lab, Tom meets his local instructor, who will taste the pizza Tom is supposed to make. The instructor has been to Rome to learn about the exact requirements for the class, so he knows what is expected from the students. While Tom's skills are being assessed, Susan participates in the weekly meeting with her fellow students in the physics lab for collaborative group work. On the other days, they meet virtually.

Having finished with the teamwork, Susan heads to the administrative office: Although school attendance has not been compulsory for her since she turned 18, she wants to attend some further courses to broaden her set of skills. At the administrative office, she browses through the module catalogue and asks the Module Counselor for advice. It is hard to choose from thousands of different modules. They are all in English and offered Europe-wide to ensure the same quality of education regardless of location. The Module Counselor opens Susan's file in the European Skills Database to take a look at Susan's existing set of skills. This reminds Susan of what her dad told her about how it was like in the past: Nobody's education was really individual, and there were always people with an equal level of standardized qualifications. For Susan, this seems unthinkable: Ever since she completed the five-year Basic Skills School (resembling former primary school) with a predetermined curriculum everyone had to go through, she has had total freedom of choice regarding which skills to acquire. As there are thousands of different modules to take, i.e. skills to acquire, every individual person has their own unique set of skills. Another thing that would have annoyed Susan in the past was the absurd idea of degrees – according to what her dad had told her, people had to acquire degrees at institutions called "universities" in order to become a doctor, for example. From Susan's point of view in 2035, this simply does not make sense: Since the introduction of skills-based, modularized education all over Europe in 2025, there are just two different types of schools – Basic Skills School and Lifelong Skills Acquisition School, controlled by the European Central Department of Education. The Lifelong Skills Acquisition School has to be compulsorily attended until age 18 and everyone can choose his own modules and therefore create their individual, unique set of skills.

Susan's thoughts are interrupted by the Module Counselor. "Your file looks pretty good to me – you have acquired quite a lot of skills that are highly demanded on the job market. I would recommend you to either get a job right away as a Junior Manager, or to acquire some more skills in order to start higher up on the career ladder. 'Quantum Mechanics – Advanced' would be an option, for example". Susan decides to take a few days to consider her options and leaves the administrative office to pick up her brother from the kitchen area. He is already waiting for her with a bright smile on his face: He has passed his advanced course in Italian cooking.

On the way home, Tom receives a notification from his home base administrative office: His new skill "Italian Cooking – Advanced level" has been added to his file in the European Skills Database. Meanwhile, also Susan receives a notification: She has just received two references, one from her fellow student in the quantum mechanics class to confirm her teamwork skills, one from her manager during her last internship to confirm her time management skills. She is very pleased about both of them, but actually a little more about the one from her former manager – his reference weighs more because he has a higher reputation than her friend from class. Also she feels quite honored to get a reference by him: To solve the problem of reference inflation, four years ago it was determined by law that everyone can only hand out a limited number of references a year, so people usually think about it thoroughly before they actually give someone a positive reference.

When they arrive at home, Susan and Tom meet their dad, who just got out of his home-office room. Tom starts preparing dinner – it is time for Italian pizza, of course! While Tom prepares the dough, the family discusses the upcoming Education Elections. Susan and Tom are allowed to vote for the first time, which is why their father explains to them how it works: "Since the Equal Modularized Education Act in 2025, education is democratically influenced by the European citizens, by us. In the upcoming Education Elections, we can choose which modules we want to be included in the future curriculum. However, also corporations make a recommendation of the skills they need people to acquire in order for their businesses to keep successful in the future. Otherwise we would go back to having a skills gap as wide as around 2017, when companies could not find enough talent that fulfilled their requirements, although many people were unemployed. Of course the government and the industry want to avoid this. For this reason, the European Central Department of Education reviews both sides – corporations' recommendations and citizen's wishes – and tries to match them in the new curriculum. Because corporations also voted on skills before, the module catalogue displays which ones are more sought after than others by employers. The difference of formalizing standardized skills in a large databases in contrast to former degrees is that today there are literally no limits of education: It does not count how good you excelled in a course that is part of a predetermined degree curriculum. Companies no longer search for the best graduates but want you to be able to find your interests and pursue them further. The task of prioritization has become urgent in recent times. Exactly this is promoted by the new system. Eventually, the objective certification of the standardized skills is the government's task." Tom knows that his Italian cooking skills are not very relevant for employers according to the module catalogue, but he does not care – he has acquired many other skills that are demanded by employers and just wanted to learn how to perfectly make pizza.

While the pizza is in the oven, the twins' dad logs on to his Homelearning Computer in order to work on his skill "Basics of Accounting". He has decided to take another free course at the Lifelong Skills Acquisition School, even though he has a Harvard degree in Social Sciences. However, since the Law of Degree Unification in 2028 prohibited mentioning any university names in resumes, this degree has lost a lot of its former value. Now it is only skills that matter. This is why he thinks it might be a good idea to improve his set of skills before applying for a new job, in order to compete with other candidates. Nevertheless, he also takes some courses just for fun, like his "Introduction to Medieval Painting".

Meanwhile, Tom and Susan check job ads online. Tom is interested in an ad where a vacancy for a Junior Public Relations Manager for an Italian gourmet food producer is described: "We are looking for a person who has at least five out of the following seven skills: management of media relations, event management, knowledge of the Italian culinary landscape, editorial skills/ basics of journalism, basics of Italian language, basics of digital marketing, high-level teamwork skills". Tom quickly goes through the skills proven in his file in the European Skills Database and realizes that he could apply even though he only fulfills five out of seven skills – the company will most likely allow him to catch up on the remaining two skills through taking further courses at the Lifelong Skills Acquisition School. He decides to apply immediately: during the application process, the responsible recruiter can view his file in the European Skills Database with the help of an access token. The recruiters will then also be able to get contact details of people who gave personal references to the applicants for further inquiries.

When the pizza is ready, the family sits at the table together and enjoys the steaming, crisp delicacy. "Are you already looking forward to your mum coming back from her course on medieval Spanish history in Valencia?", dad asks. "She will be back next week, I talked to her today. She likes her course a lot and strongly recommends you to also acquire skills in Spain!" Susan likes the idea of going to Spain, but is not sure about her interest in dusty Spanish history. Instead, she might just continue her course on quantum mechanics in Spain. Why not – she could just attend collaborative group meetings at the Education Lab there and continue studying through her MOOCs via the Homelearning Computer. All of a sudden, her father jolts her out of her daydreams of sweet life in Spain by commenting on the pizza, which is almost completely gone: "This pizza is delicious, Tom! Is there also a course on Italian gelato-making? I will suggest this for the upcoming Education Elections!"

Signposts

- Government loses educational restrictions and fosters individualized curriculums
- Widening skills gap requires skills-based education
- "Portfolio careers" hinder distinction of talents
- International collaboration is further enhanced
- Education becomes free for all citizens regardless of age, national origin, religion, wealth
- People can influence educational content democratically
- Progress in digital technology allows one-to-one interactive artificial intelligence teaching

David Adrian, Michael Braun, Simon Maier, Michael Miksch, Johannes Rausch, Nathalie Wilk

SkillED

A day in 2035

"What does the abbreviation CIA stand for in data security?" - "Confidentiality, Integrity, and Availability" - "You are right." Mila's smart glasses switch to the next question, visualized in her peripheral field of view: "Which algorithms are most machine mentor services based on nowadays?" - "I know this. Deep learning algorithms?" - "You are right. Congratulations Mila, you just completed the last test section!" Mila switches off the glasses and prepares herself for the final sprint. She sets her goal in the distance and starts running as fast as possible.

Done. The day starts off pretty well. Not only did she almost beat her all-time record on her regular jogging trail, but also achieved a new personal best using the skill testing software. A small vibration and the test fee is immediately deducted from the electronic wallet on her smart watch. Mila enters the quiet house, her parents and brother are still in bed. She makes her way to the shower, ignoring the next vibration on her wrist.
As she enters the kitchen half an hour later, Mila finds her father enjoying a fresh coffee and watching the news on his smart glasses. She grabs a cup herself and glances at her watch: "New match on skillED". Mila's eyes widen, she rushes to get her smartpad. Disappointment grows as she reads the notification in detail. Yet another internship is proposed to her on the world's biggest skill database, which just lately celebrated its two billionth user. "I still don't understand how this skill thing works", her father comments while looking over Mila's shoulder. "It is called skillED and, of course, you don't understand, you've been working at the same place all your life, Dad. You even insist on having your university degrees hanging around in the living room. Nobody needs those anymore, it is all about skills today and apparently mine are still not good enough. They offered me an internship again, but what I need is a real job with real money! I turned 21, I finally want to move out of this place!"

Mila is cut short by her mother entering the kitchen, humming cheerfully as always. Mila never understood how her parents managed to be that relaxed and satisfied with the little they had. They weren't poor, but a private education mentor, like some of her friends have, was never an option with her family's tight budget.

Mila gets back to skillED. With the emergence of novel technologies and concepts in education that brought forth very qualified students, the importance of traditional university degrees declined significantly. Motivated by alternative education movements in society, an anti-discrimination law was passed. The law forbids companies to inquire about university degrees during the application process and urged them to only consider applicants' actual skills. This paved the ground for skillED and other assessment providers. With the use of digital assessment technologies, they gather accurate data about people's theoretical knowledge and practical skills and save the results in large databases. Most companies rely solely on these databases when looking for interview candidates: While they are displayed the most suitable candidates, private users like Mila are matched to a small subset of companies according to their skills. Ranks on skillED fluctuate each day and rumor has it that not even the company itself understands all algorithms included in the process.

As every day, Mila decides to consider also her machine mentor. The algorithm-based learning assistant adapts to the learner's abilities and skill level to leverage the student's individual progress with tailored learning proposals. With the use of big data, all relevant information regarding personal, societal, and industrial developments are taken into account for an optimized learning experience and outcome. The machine mentor assists Mila by increasing her match rating for a desired job. The subscription based service, which is subsidized by the government, costs Mila as much as two tickets to the cinema per month. More sophisticated products exist, but due to her limited financial means, Mila only uses a basic machine mentor software. Today the mentor is proposing Mila to improve her skills in robotics in order to reach a higher rank on skillED and tackle her career goals. It suggests her to take Linear Algebra in Robotics held by the famous Katleho Thuto. He made history by being the first person to win a Millenium Technology Prize without having a university degree.

Mila gets her online courses from various sources. Some of them offer basic knowledge for low prices, others specialize on high quality lecturers and charge the learner accordingly. The mentioned course is of the latter sort, thus she navigates to one of the premium platforms to get an idea of how much she has to come up with. Her smart pad contains a biometric authorization interface that let people prove their identity over the internet. The smartpad analyzes her voice pattern, scans her fingerprints and facial features and sends the information to a verification server. This goes back to an incident where the complete database of one of the leading e-learning institutes was leaked, effectively putting them out of business in less than a day and accelerating the development of biometric access control technologies. When the system was introduced in 2026, privacy groups protested, but now the concept has proven to be rather safe and people are glad about not having to remember 16-digit passwords with special characters anymore.

On the starting page of the platform, Mila already sees a banner for the course she was looking for. "Of course, it's just an advertising heist, I bet there are thousands of people who just got the exact same proposal by their machine mentors", she thinks to herself. Anyways, she clicks on the banner. It gives a short description of the lecturer and an outline of the sessions. The course would be perfect to move her at least ten points up on skillED, but the price… "That's more than our monthly rent!", her father cries out in despair, having peeked over Mila's shoulders once again. "When I used to study there was no such thing, everybody would…" Mila knows her father's strong opinion on the education system, among her friends he is widely known as the "Bologna Dad". She feels relieved to see her 9-year-old brother Kurt hurried past them into the living room and ending the discussion. Kurt is switching on his EDUbox straight away to start his daily edutainment program. Digital homeschooling had become a widely accepted alternative to classical elementary schools after governments made way for it through legislation in the 2020s.

To get away from her noisy brother and not upset her father any further, Mila escapes to her room and closes the door. What she is about to do right now gives her goose bumps. Since the anti-piracy act of 2026, protection of copyrights is taken very seriously and penalties are strict. For the last years, the news were filled with mostly young people who were sent to prison for pirating movies and music but also educational content. She activates an app that connects her smartpad to a proxy server to hide the traces she leaves on the internet and heads to The Pirate Bay, searching for the robotics course by Katleho Thuto the machine mentor advised her to attend. Mila knows the danger but does not know another way. The download takes just a few seconds, yet seconds of uneasy tension. "At least they have free food in jail", Mila thinks while she transfers the files to her watch, "and I would not have to drive to work for hours every morning."

Speaking of work. Mila almost missed her ride into town over the morning's happenings and gathers her stuff together. Living with her parents also means being stuck in the countryside, as housing in the city center has just gotten too expensive for the family. She heads outside just in time for the pickup and is greeted by seven other neighbours with whom she shares the ride every morning. The small group is approached by a self-driving jeepney, a minibus equipped with eight seats which may be arranged to individual smart working spaces for a productive ride.

Mila puts on her virtual reality glasses and headphones and dives into the first part of Mr. Thuto's course. The virtual reality course format typically consists of three components: A one-sided presentation mode, in which the lecturer communicates content to the audience, an interactive communication mode in which a small group of students jointly elaborates on a topic, and practical simulations in which students gain "hands-on" experiences in a virtual robotics laboratory. Since she illegally downloaded the content, she can only benefit from the lectures and the simulation exercises but is excluded from interacting with other students.

The car passes the old main building of her father's beloved public university which is no longer used as such, but now accommodates a dozen of private education companies and start-ups. Triggered by the big economic crisis in 2017, private companies started to take over the education market, eventually leading to the full privatization of higher education.

Mila is dropped off directly at the doorstep of her work. It's the final day of her internship at a tech company and she hopes for positive feedback from her boss, which would result in a higher skillED rank. Although the company Mila is working for is not among the country's most attractive employers, the work experience she collected there could be of great use for her future career, as her machine mentor advised her to work on her project management skills. Another advantage of working at a middle-rate company is that the internship is for free. Some of Mila's friends had to take out a loan and pay for their time at an admittedly more decent company. She certainly would have liked to get a higher ranking, but in the end Mila was glad to get an opportunity to raise her skills without having to get into debt. Mila feels another vibration at her wrist, her blood sugar has dropped and she gets the advise to have lunch soon. The watch is asking her if she wants to order a meal from a delivery service.

She presses “yes” and after 15 minutes a drone makes its way through her window with a customized meal, adapted to Mila’s nutritional needs and taste. Shortly before the end of work, Mila is called into her supervisor’s office for the final feedback. She makes her way along the corridor, feeling nervous as this feedback might be really important for her future employment chances.

Half an hour later, Mila leaves the office with mixed feelings. She got the impression, that people liked her a lot at this company, but she isn’t sure if they really meant it. In the end they agreed on giving her reference points in teamwork, project management, and C* programming. Secretly she had hoped to get a better ranking in leadership. Still, she is quite pleased with the outcome. It could have gone way worse. Her supervisor promised to add the new references to her skillED account before heading home. Until then Mila is left on pins and needles, now halfway glad to have volleyball practice keeping her from staring at her wrist every ten seconds.

Although being tired, Mila makes her way to the court. There is no way around it, since she has to retain a scholarship which allows her to access specific premium courses for free. Sadly, she finds only little enjoyment in the sport she once loved more than anything else, now that she is under so much pressure. The whole team is currently competing and trying to get into the finals. Trainings are hard and enduring and sometimes stealing Mila’s last bits of power. She clenches her teeth and keeps practising until 9 o’clock.

Mila rushes outside to get picked up by her shared ride again. As soon as she sinks into the seat, Mila reluctantly continues the online course she started this morning. While Mr. Thuto explains the reasons and problems of the singularity condition, a notification from skillED pops up. Mila starts shaking as she opens her skillED account to check today’s final score. She cannot hold back a small shout of joy and the fellow passengers throw her a bewildered look.

“Congratulation, Mila! You have four new matches.” Mila’s eyes rush through the newly offered companies and suddenly stop – her favourite company is listed. Not an internship, but a full-time position could be hers. This needs to be celebrated! Mila changes her final destination to Mos Eisley, her favorite bar. She sends out an instant group invite to her close friends and leans back. All that hard work seems to finally pay off.

Signposts

- Higher number of private than public institutions in tertiary education
- Increase in individualized curricula
- Decree of an “Anti-Discrimination Law”, whereby people may only be evaluated based on skills and not the completion of a degree (cf. gender equality)
- Stricter copyright laws and harsh punishment for violators
- Biometric data access control allows authorisation over the internet and easier enforcement of copyright infringements
- Distance education becomes common with the rise of online education and supporting legal regulations
- Increase in job matching services

Irman Abdic, Benjamin Borrow, Steffen Iwan,
Isabel Poppek, Valentin Rüchardt, Ahmed Shafei

Degree Inc.

A day in 2035

Somewhere in Bavaria, in what used to be grazing country, the dawn sun hits the Big-G University student residence. Not long after, the company anthem sounds out, and the students begin to rouse. One such person, George, is an automotive software engineering student, whose daily academic tracker reveals he is roughly 64.56% through his accredited Big-G degree.

While he readies himself for the day, George ignores a number of holographic-streamed calls from his father. Today, George isn't in the mood to listen to his father gloat about the good old days of being able to enter the workforce without a strictly accredited degree. Nevertheless, George is emboldened by the knowledge he was lucky to be accepted to Big-G's exclusive and streamlined program, so he walks down stairs to wait for his self-driving Big-G car. As the car drives to the central learning region on campus, augmented reality windows alert George to real-life examples of engineering applications he has previously studied. In true "just-in-time learning" fashion, George can also request specific information he would like to have clarified. However, after a brief time of selectively learning at whim, the computer aboard his car processes George's academic record and suggests material he might like to revise. George is falling behind in class, and the networked information stored by learning platforms throughout his university attempts to ensure he has quick and easy access to the necessary learning material. After some in-car revision, George arrives for his first block of classes. He particularly enjoys this block, because it feels more like playing than learning, and if the subject were not explicitly labelled "Strategic Planning," George would mistakenly believe that he was studying a crash course in video gaming. Once a few rounds are completed though, George is irritated by a classmate who can't help but mention his gaming console is considerably more advanced than George's. This kind of comment shirks George, and as his father might remind him, his classmate's attitude is what one might expect of students embedded in a system where educational tools are used for competitive advantage to get the highest grades and best degrees.

At least it's lunchtime now, and George walks to the Big-G Food Hall where his food is splashed onto his plate by the service robots that effectively replaced humans in low-skill jobs a few years ago. The optimized service has not resulted in better quality food though, and George overhears an Italian-accented complaint about the bolognese on offer. Amused, George strikes up conversation with the complainer, Vincenzo, who justifies his move to Germany. Vincenzo explains that he is a perfect example of student migration to regions of private academic institutions with local-specialisation. Vincenzo, a motor programing enthusiast, claims Italian universities have started specialising in oenology and gastronomy, and simply do not offer the kind of mechanical specialisation that has developed in Southern Germany.

"That's the way of the world," interjects a girl walking behind George and Vincenzo. Brushing aside a clump of her dreadlocks, she introduces herself as Kelly, and explains how her personal history, too, has lead her to pursue a Master's Degree at Big-G's corporate university. Kelly tells her two new companions she used to be extremely anti-capitalist and participated in the Occupy movement as a child with her parents. However, since public institutions have lost considerable funding, and the anti-capitalism movement has generally lost momentum, highly educated and self-motivated people like her have no choice but to enrol in private institutions.

"I'd love to stay and chat," interrupts George who is beginning to worry his lunchbreak might turn into an uncomfortable discussion about politics, "but I've really gotta get to Spanish." A few years ago, the idea that he might one day be learning Spanish would have seemed absurd to the self-professed linguistically-challenged George, but now that Big-G is expanding into the South American market, he is required to attain some Spanish credits as part of his degree. Thankfully though, George has the option of attending either teacher-student classrooms, or watching a video class (sometimes incorrectly referred to by his classmates as "Modern MOOCs") at his own pace. Like normal, he'll just watch the video today, and ask his personal tutor some questions if he encounters anything unclear.

George often struggles to stay motivated learning at his own pace, and since he's planning to have a game of tennis after class, he decides to leave early. His personal learning companion makes note of this to remind him to catch up on the Spanish before the week is up. Just as soon as this is loaded onto his learning profile, a Big-G car arrives to drive him to the tennis courts. He asks the car for today's headlines, and is

interested to find out the leading story is that the last surviving public university has been bought by a telecommunications company. The newsreader mentions it is the final acquisition after private corporations began purchasing chairs of public universities, and finally began acquiring entire institutions.

Just as the newsreader was about to explain which departments were expected to be shut down once the acquisition is completed, George receives a call. It's his friend, Ritchie, who wastes no time with pleasantries and asks George for help with something he's working on. Ritchie is paying through the nose to study medicine, but expects that the private wiki at Big-G University might have the information he needs. "Oh come on bro," protests George, "you know I can't share that kind of information with externals." - "But we just got accredited," retorts Ritchie, "our wiki is as bare as a baby's bottom." Since Richtie's private university had only just been given accreditation by the consortium of medical companies that provide benchmark degree standards, their resources were not nearly as developed as other similar universities. "Tough break" says George, in continuation of the distinct 'surfer tone' that had organically developed in their conversation. Disgruntled, Ritchie hangs up and George's car arrives at the tennis courts. He sees a girl waiting with the other players, and assumes she is the new recruit the team found through a search of the student profiles where both academic interests and extracurricular activities are listed. Unfortunately though, the profiles provide no indication of talent. And after another new recruit, Max Power, hits all the balls over the fence and into the thick bush behind the courts, the game must be called off.

While George awaits his car, he strikes up conversation with Paula, a somewhat dishevelled yet nonetheless attractive girl who is waiting for her typically delayed public transportation system. After a few brief moments of hesitation, George finally asks why Paula looks so familiar. "Wait, didn't we go to the same primary school?" Asks Paula inquisitively. Indeed, Paula used to always sit in front of George in German class, and was normally the student with the most gold stars appended to her collar. However, Paula's parents could not afford the highly expensive private schools and universities available today. "But what about some of the scholarships you could have received for your natural talent? I know Big-G has plenty of those."

Dejectedly, Paula concedes her primary talents lie in German and other non-scientific fields, which are not highly demanded by industry. As a result, both private universities and corporate universities have continually turned her away. "You should give the new Environmental University a shot then!" Proclaims George, attempting to avoid seeming exceedingly patronising. George had heard the new Environmental University, one of a number of specialist private universities was looking for PR students, and was confident they could do with poor Paula's help in spreading the word.

As a Big-G car turned the corner and headed towards the pair, Paula thanked George and started walking off. But, George grabbed her hand before she could get too far, and offered to give her a ride home. The two drove in silence, and George deactivated the augmented reality windows in an attempt to make the car appear about as sophisticated as what Paula would expect of student vehicles. But he could not disable his daily academic update. "George McDonald, you better work harder - you've slipped to the top 27th percentile of your cohort." Stated the overhead speaker. "Top 27th?" Enquired Paula. " Isn't that good?" George wanted to agree, but explained the strict Big-G policy in force. In actual fact, Big-G only guaranteed employment to the top 25% of his cohort, so unless he improved his grades, he would also have to seek work at other technology firms, in the hope they did not mind he had learnt a highly specific Big-G curriculum.

George seemed a little ashamed of his grade and hoped they'd soon arrive at Paula's house. Thankfully, Paula pre-empted this arrival, and asked to be dropped off at the corner so she could buy some food. On the way out though, George asked if he could sync their personal communication numbers under the pretence of helping her out with the application she was going to write for the Environmental University. Paula obliged, and the car door closed behind her.

After arriving back at the student residence and consuming another machine-arranged meal for dinner (George didn't have to shop for food like Paula), George was once again reminded of the Spanish he needed to catch up on. He mulled this over in the communal shower, and as he dried himself, he spotted a neighbour he knew to be Costa Rican. He carefully enquired for help with the Spanish work, but the Costa Rican smiled slowly as he collected his belongings, turned, and only half-joking said, "Help is so 2010s, man."

George got back to his room, and was slightly perturbed he'd have to seek help elsewhere. So he booted up his personal learning device, and started a face-to-face private tuition course with a specialist Spanish teacher. While this kind of service was not cheap, it was common practice for students to pay for private tuition on-top of their normal education services offered at university. Plus, Big-G allowed students to take out loans for such services to ideally be repaid once they were working for the company.

After Spanish, George worked on a side small R&D project in the corner of his bedroom he'd been progressively dedicating more time to recently. He was incentivised to do so, because his debt to Big-G would be reduced if any designs or prototypes he produced for University were brought to market. As he worked, he felt a little less guilty for not helping Ritchie with his medical work earlier in the day. The students at those non-corporate private universities can sell their work themselves, and he'd heard of some people earning good money by selling completed projects to companies while they were at university.

The prototyping was starting to take its toll on George's fingers, and the prospect of replacing his soldering iron with a beer in his hand became too great. The first and second beers went down so well that he considered calling Paula's number he'd gotten that afternoon. By the time the third and fourth beers had truly given him some liquid courage, he ordered his stream server to give Paula a buzz. "Wanna come to a party on campus?" Inquired George. Keen to experience a true university party for the first time, Paula quickly agreed and promised to be at the residence hall as soon as possible.

While he waited, George began to get nervous. Is this a date? Should I put on more cologne? George also started to worry about the inevitability of bumping into some Big-G recruiters or future employees (like most of the parties on campus, this one was almost certainly going to be sponsored by Big-G). No, this anxiety wouldn't do it, George needed to improve his soft-skills. He decided to search for a class he could take at university, and to his pleasant surprise, a personalised suggestion on his home page included a link to enrolling in "Introduction to Interaction." For tonight though, he would have to rely on intuition.

Once Paula arrived, and politely complimented George on his cologne, the two headed across the road to the residence hosting the party. They arrived to find most people were dressed in what his father would describe as "Business-Casual" - but what George knew to be "Big-G Standard". Paula and George mingled for a while, but conversations invariably revolved around academic ranking and plans for the future. Tonight, a number of newbies were at the party, too. They were drinking a little more than the Big-G students, and it was quickly revealed they belonged to the Stanford franchise that had opened not more than 10 km away from Big-G's central learning region.

"This is what you call a campus party?" Whispered Paula to George. "Let's get outta here!" Apparently, Paula expected the same kind of campus party George's father would often rave on about in moments of nostalgia.

Paula pulled out a hip-flask of vodka, winked at George and ran out the front door. George, thrilled by her spontaneity, followed her into the night.

Signposts

- Public funds in education progressively decline
- Corporate organizations begin purchasing departments of/ entire public universities
- Corporate-backed universities provide accredited academic education
- Government regulations increasingly place degree requirements on workforce recruitment practices
- Capitalism more widely recognised as ideal social condition
- Artificial intelligence partly replaces skilled workers
- Industry consortiums establish benchmarks for degrees to be accredited
- Reduced demand for non-specialist degrees and degrees with low guarantee of direct future employment
- The application of digital technologies diversifies and thus, addresses students of various fields of studies
- Private universities increasingly protect their intellectual property.

Bastian Burger, Fabian Frank, Aishwarya Ravindran, Julian Roos, Stefan Tischinger, Hassan Zaheer

Degrees of Trust

A day in 2035

The year is 2035. On a warm summer night, Tom sits on a sofa in a dim corner of his loft in Berlin and prepares for an exam he has tomorrow. Like many other 27 year olds, Tom studies management at one of the universities in Berlin. This university does not differ much from the others in Germany, as they all have the same curriculum provided by the state. Tom puts a lot of effort in preparing for the exam he has tomorrow, as the degree will determine his future.

At least it has a huge influence on his overall masters' degree. After all this degree will be the major selling point for Tom in getting a job. Tom's generation only occasionally learns out of textbooks. Rather, in 2035 the main sources of information are online platforms. This is why he sits in front of his Powerwall watching a state-provided MOOC showing an instructor that is teaching him how to finance a company. After completing the course, he tests his acquired knowledge with an interactive e-book to make sure he will get a good grade tomorrow. Frightened by the fear of competition amongst the students, he takes a moment off, remembering the 2015's when he went to the John Ruskin elementary school and the boring days he spent watching the instructors teach without a hint of fun. The elementary education cost his parents a small fortune, but they knew it is the cornerstone to a successful career.

As he sits there in his small apartment, reading the coursework, an email from his university pops up on his Powerwall. It asks him to schedule the varied modules he took at the universities in London, Barcelona and Stockholm into his curriculum. He notices in his university's web platform that he might have to accomplish two more standardized courses that he might also do abroad. Winter semesters in his hometown are not that thrilling when it comes to weather so he could do the same course in Madrid or Naples as well.

He notices the photo of his elder brother on the window board. Every time he sees it, he is reminded of the time his brother went to a private college ten years ago. Although, Tom was still a little child, he vividly recalls the auditorium and the students in the library who had to study for a fee worth a car every semester. Although it was common in former times to get private education, his brother was in the last generation that had to pay for a good higher education. Back then, young Tom followed the parliament's discussion that led to the laws which ensured a free and totally public education system. This law ensured a qualified workforce. One way to do that was to grant him the opportunity to study wherever he wanted. Also switching locations between the semesters.

Still, there is an exam coming up. Tom has been studying for one week already and now wants to revise his study material. So he plugs in his electric drums and his Powerwall lights up again with the rhythm game. For every question posed, he needs to hit the correct spot on the drum that refers to the right answer. "Music at last!" he says to himself. Tom is in music heaven with his drums when the doorbell rings. "Must be Cherry", he sings. He opens the door. "Hi Cherry honey," Tom rejoices. They kiss.
"Hey darling," Cherry replies as she enters the room.
"How was your job interview today?"
"Tom, it was dotty. I had that feeling that we had a good personal fit but since I do not have all the required degrees yet, I highly doubt I will get in there." Cherry thinks that the emphasis on degrees is too strong.
"Never mind my little moggie, you have so many great soft skills and experience. It's not your fault they don't count in a corporate environment nowadays." Tom sensitively replies. "So what's the new plan?"
"I have another interview tomorrow where I might get an employment as a consultant."
"That would be great," Tom cries, "I love my own work as a consultant, it is great fun!" "Actually…" Cherry hesitates, "it would be at your company. Is that okay with you?" "Oh," Tom shies, "of course, I'd love that. You know I will go work there tomorrow morning right before my exam."
"Hmm, don't be at sixes and sevens! Don't risk your exam my nipper."
"I won't," Tom protests, "all those edutainment programs prepared me very well for what's up to come. And apart from that, it's just all common-or-garden multiple choice questions." That said Tom and Cherry go to bed after discussing more for a few more minutes.

The next morning, Tom appears in a sharp suit at his office. As a working student it is his task to analyse cash flow problems. Tom starts working on the same problem he has been working on since last week but cannot find the solution to it. His boss, Dick, walks into the room directly approaching Tom. “How’s work Tom?” asks Dick, in his strong voice. “So far so good” Tom replies exasperated. Tom explains what he has been doing - improving cash flow by either inhering prices or changing payment dates, as he was taught in school. “I think it’s a good idea what you’ve done so far” Dick starts to praise, “but it’s all bullshit. See here…” Dick takes out a notepad and a pen and sketches some creative solutions for the companies in dire straits using their individual balance sheet properties. “How do you do this?” Tom asks in awe. “Simple. Be creative, think outside the box.”
“How can I learn this?”
“That’s the entire point. You can’t. Just be it. Back in my days we had much more time on our hands to let go. That’ll help you being a creative genius.”
A huge weight off his chest, Tom asks Dick, “How has your day been so far?” “You know how it is, kid”, he starts, “today is interview day and this generation has got nothing but degrees, degrees and certificates. There is only one girl who was all sweet talk. Lil crazy but that’s what we need here. Unfortunately, I can’t hire her with all my working students, right? She’s got no

certificates to prove her skills, just her past work experiences!” Tom feels bad for his girl friend, another job interview down the drain!
While exiting the room, Dick shouts back to Tom: “Before I forget: I was told, some girl is waiting for you outside. She wants to drive you to your exam. She might be really angry with you making her wait so long.” Tom packs his bag and rushes downstairs.
Lord Harry is sitting lonesome in the cafeteria of the university. The superintendent, usually busy administering the study programs for all the local universities, watches a movie on his wristwatch. Dick tumbles into the food distribution facility.
“Thou art late old friend,” Harry urges.
“Shoot me pal,” Dick repels, “why do we have to meet here?”
“Students protest in the city.”
“Those privacy beggars, again?”
“Right, Sir. Wherefore shall they protest, it is inaccessible to I.”
“Don’t play dumb Harry. Your system is far from perfect. You’re collecting a lot of personal data from students. That ain’t so nice, right?”
“What denies us of perfection?”
“The fact that all the data lies centrally with government, everything on their servers, they can look up anyone they want to and get insight into their private lives“ Dick replies agitatedly.
“I will explain“, says Harry, taking a calmer serious tone „yes, privacy issues are coming up the surface, and a lot of organized protests have started to arise among the students.

The students think the government made all the educational programs, records, and everything related to that central because they want to spy on the students. You know, keeping a look out for anything out of the ordinary... which is absolutely not true..."
"... the centralized system has a lot of benefits of its own, modular education, easier mobility, and an enhanced number of international exchange programs, all this is happening because the system is centralized, and we can show general results and efficiency of the system to convince countries about the quality of our students. And all this is done using big data solutions, without using any individual's data specifically."
Dick, still annoyed, says "I'm not okay with everyone having access to my data! The students are not okay with anyone knowing of their grades and curriculum at the click of a button!! That's only for them to know."

Harry takes a sip of wine out of his plastic cup and considers. "You speak the truth my friend. Can you consult me and the agency in overcoming those hurdles?" "A new project, sounds like honey to my ears. It's a deal."

Students rush out the auditorium. Tom is among them. Cherry was waiting in order to pick her boyfriend up after the exam. Tom falls in her arms. By coincidence the auditorium lays vis-á-vis the cafeteria. Dick oversaw the scene and notices Tom and Cherry in the crowd. He waves at the couple and shouts: "Hey Tom, Cherry, come over here!" When the both of them reach the table Dick passes the good news. "We got a new project and I need you all. Cherry, welcome on board."

Signposts

- The last private university is nationalized
- Increasing income disparities lead to heavy demonstrations because education is hardly affordable anymore
- Corruption and inefficiency of the private education industry leads to the failure of models like privately offered MOOCs
- Students must be enrolled to a central national education system and not just to one specific university
- Introduction of the first central educational data system for student records and data monitoring
- Government decides on the education agenda for 2030 to increase the percentage of public education
- Most of the renowned companies accept students only on the basis of proper degrees

Ideation

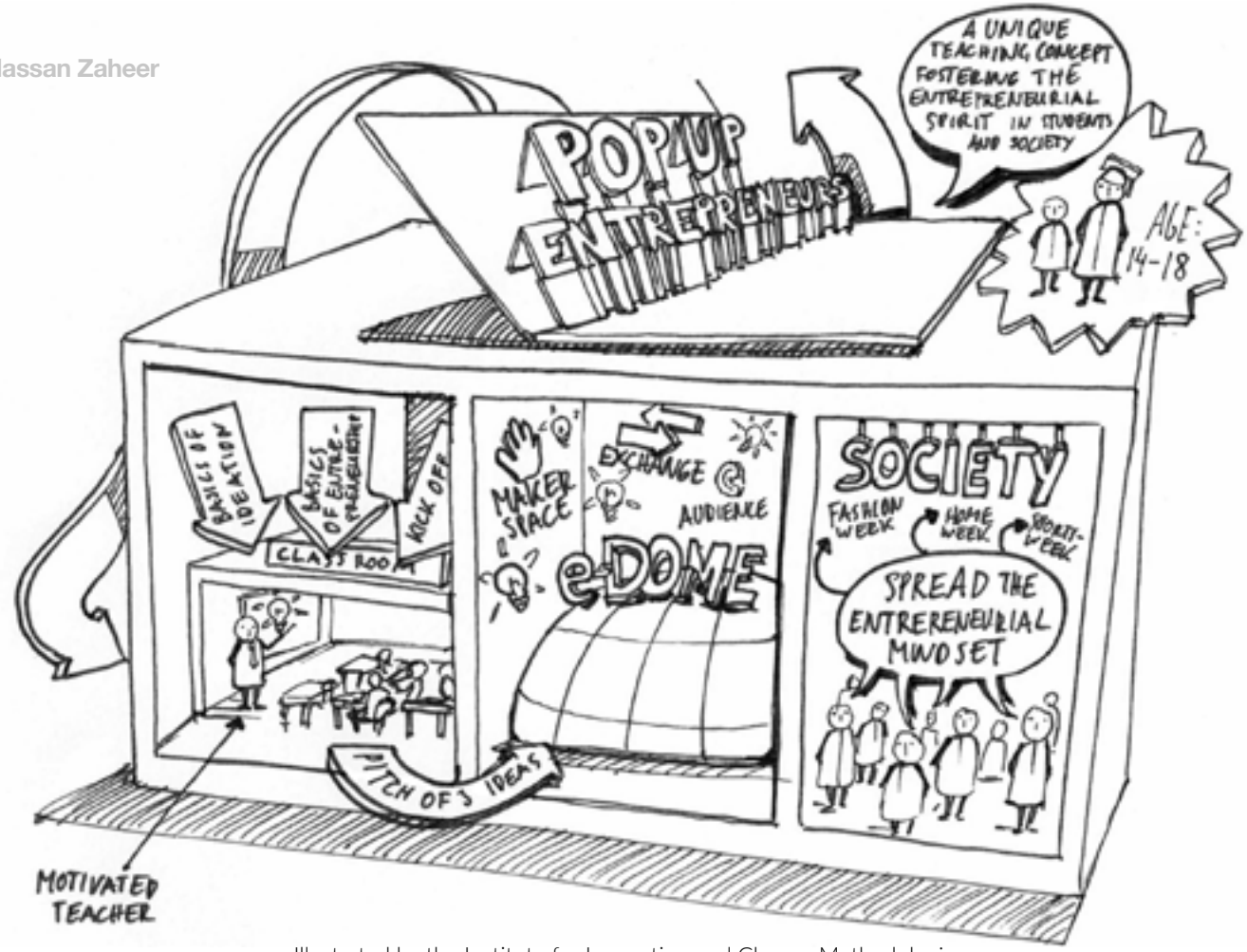
The following chapter describes five novel educational concepts and corresponding business models. Each of the business models is described using the Osterwalder Business Model Canvas. While four of the business models are profit-oriented and planned for a potential startup company, the fifth idea is a non-profit concept for a foundation.

An exhaustive description can be found in the Chapter Methodology.

Steffen Iwan, Simon Maier, Asif Nadeem, Nathalie Wilk, Hassan Zaheer

PopUp Entrepreneurs

A unique teaching concept fostering the entrepreneurial spirit in students and society.



Illustrated by the Institute for Innovation and Change Methodologies

In the US 13% of entrepreneurs are between 18-24 years old, but the numbers for young entrepreneurs are far lower in Europe. Here, only 7% of founders belong to this age group, despite the fact countries like Germany offer an inviting entrepreneurial infrastructure. PopUp Entrepreneurs is a foundation trying to solve this problem by offering unique entrepreneurship teaching for school students aged 14-18 years. It gives school students the opportunity to get the flavour of entrepreneurship at an early age by enhancing their creativity and product development skills. Selected students get to spend two weeks under the supervision of instructors in a creative space specially designed for such a purpose: the eDome. They learn about business modelling and entrepreneurship and get to refine their product ideas. Furthermore, students get hands-on product development experience by working on these business ideas during their time in the eDome. At the end of the two weeks, students present their products in an exhibition open for external visitors.

Once a year, school classes can apply through a teacher to get coaching in the eDome. In each city, four groups are selected to learn design thinking and business concepts and generate product ideas. The additional classes are held in students' free time by their teacher and PopUp Entrepreneurs instructors and run in parallel to their main studies. After this preparation phase, the groups arrive at the eDome with three refined ideas per group, from which the PopUp Entrepreneurs team chooses one and the students continue working on it in the eDome.

The foundation also aims to increase awareness for entrepreneurship in society and foster a start-up culture in Germany.

PopUp Entrepreneurs does not only focus on founding companies, but on promoting creativity, responsibility and social skills with a hands-on learning experience. Hence it encourages schools to incorporate teaching content like product management and entrepreneurship in their curriculum. In order to get more public attention, the eDome will be set up in city centers or popular spots, open for the public during certain hours to inspect the projects and interact with students. The whole set-up will move to another city every two months to spread countrywide awareness while working in close collaboration with the government and education partners.

Business Model

Key Partners

- Government
- Entrepreneurship education institutes
- Education foundations
- Acceleratorsw

Key Activities

- Recruiting
- Teaching and workshops at schools
- Prototyping at the eDome
- Organizing events at eDome
- Organizing networking events for teachers
- Spreading the concept via social media and ambassadors
- Fund Raising

Key Resources

- Physical: eDome and its location in the centre of town
- Human Resources: Instructors, teachers, speakers
- Online Community

Value Proposition

- Fostering entrepreneurial spirit in students and society
- Schools get opportunity to include the innovative project course
- Teachers gather contemporary pedagogical knowledge
- Students gather hands-on-experience & learn creative thinking methodologies

Customer Relationships

- Co-creation with private foundations and educational institutions
- Communities for teachers, students and start-ups
- Reporting to investors (government, private foundations)

Channels

- eDome, a mobile facility with learning materials for hands-on product development
- Instructors teach the methodologies and support teachers
- Social media and ambassador marketing

Customer Segments

- Schools: Teachers and their students (14-18 years)
- Entrepreneurial awareness in society
- Start-ups

Cost Structure

Variable Costs

- Instructors
- Transportation and Logistics
- Fundraising and Marketing
- Networking Events

Fixed Costs

- Design and Construction of the eDome
- Teaching content creation
- Website creation and maintenance

Revenue Streams

- Governmental Funds
- Funds from Private Foundations

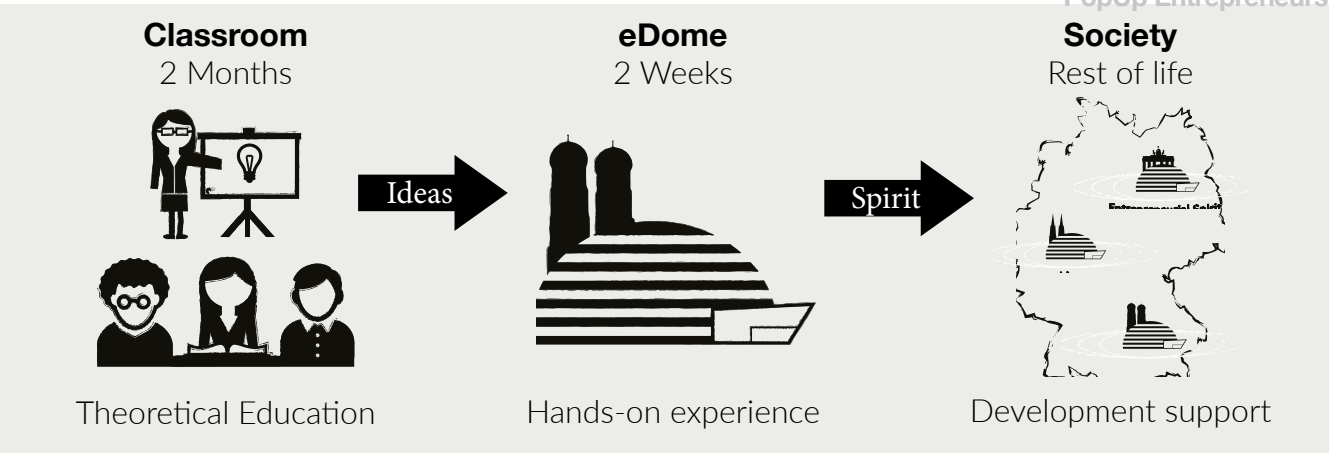
Customer Segments

In order to build an effective non-profit business model, with the goal to foster entrepreneurship in schools and society, PopUp Entrepreneurs identified major beneficiary segments to serve. Namely on the one hand, high schools consisting of teachers and students are major stakeholders and on the other hand, the whole society represented by the government, startups and private foundations are also crucial.

Schools: Schools are the hubs of education. Reaching high school level, students are capable of understanding and applying entrepreneurship. PopUp Entrepreneurs offers a complementary educational building block to equip students with the basic tools for innovative thinking which are required to succeed in a vibrant and technology driven future. Students get important hands-on learning experience and PopUp Entrepreneurs supports schools in educating the next generation of innovators to shape the future of Germany. These future innovators are needed in Germany and young people with entrepreneurship education are up to five times more likely to set up their own companies. Teachers also benefit from PopUp Entrepreneurs and strive to find innovative and engaging learning methods for their classes and their personal development. The concept targets a broad set of high school teachers, irrespective of their background. Every teacher who feels capable and willing to offer the PopUp Entrepreneurs sessions as an extracurricular course can apply.

Society: Besides educating the current high school generation, PopUp Entrepreneurs also targets the general public. The goal here is to gain momentum and establish a mainstream entrepreneurial mindset. Representative of society, the government, private philanthropic foundations and schools will be addressed to support and co-create the educational concept of PopUp Entrepreneurs.

Start-up companies: Start-ups that have an interest in displaying themselves and their services on a public platform are targeted by PopUp Entrepreneurs. The eDome provides this platform and offers exposure to an interested audience. Start-ups also serve as motivation and inspiration for the young students and can be approached to share their experiences.



Value Proposition

PopUp Entrepreneurs' core mission is to spread an entrepreneurial mindset in students at an early stage of life and at the same time spark the interest in entrepreneurship throughout broader society. Europe and Germany lag behind the USA in terms of innovative startup companies and a need for education in this field is present.

Entrepreneurial education is largely about personal development regarding identifying opportunities, handling responsibilities and creative thinking. Therefore, the distinctive feature of PopUp Entrepreneurs is to foster those skills. Students gain hands-on entrepreneurial experience from the age of 14 and get to know design thinking and innovative thinking methodologies. It is considered a sustainable approach, which starts on a micro level in the classroom and spreads over the whole society.

The first phase of PopUp Entrepreneurs lasts two months and takes part in the classroom itself. Students get an introduction to the topic by PopUp Entrepreneurs instructors who also support school teachers by bringing across further topics like the basics of business and the first ideation sessions. After selecting the students' most promising business ideas, PopUp Entrepreneurs takes them into the public space to prototype these ideas in the eDome. The eDome is a portable booth, temporarily placed at prime locations in major cities. In this booth, product development workshops take place where students create new products and entrepreneurial education is accessible for every interested passer-by. Towards the end of their two week stay at the eDome, students present their final ideas. As a follow up and to keep the entrepreneurial spirit of the students active, PopUp Entrepreneurs provides them with an online network to connect with start-ups for a summer internship or to inform themselves about entrepreneurial study programs in higher education.

The unique approach creates value mainly for the following beneficiary types and their stakeholders: High schools get the opportunity to include the innovative and prestigious project course into their curriculums. Teachers gather contemporary pedagogical knowledge and the combination of hands-on-experience with creative thinking methodologies enriches the students' learning experience and personality development. Society as a whole benefits from the accessibility and public exhibition of education in inventive thinking paired with product development. By partnering, start-ups benefit from the opportunity to present themselves and their products or services at the eDome in prime locations of major cities. Educational partners get the opportunity to market their brand publicly and recruit highly motivated students who have already gathered entrepreneurial experience at an early age. A new cohort of potential entrepreneurs is educated and will close the gap between the entrepreneurial landscape in Europe and the United States.

Channels

To deliver the educational mission and its accompanying value to the identified beneficiaries, PopUp Entrepreneurs defined several efficient and cost effective distribution and marketing channels.

Firstly, there is the pivotal channel, the eDome, a temporary physical touch point where students gain hands-on learning experiences in entrepreneurship and product development. The facility is open for public visitors during the opening hours every day.

In detail, the eDome is a mobile facility equipped with learning materials and machinery for hands-on product development. It moves around like a circus and stays for two months in each place. The construction is located at prime locations in the center of major cities to attract a big audience with entrepreneurship and creative thinking.

Student groups work there for two weeks each (in total four groups of students during a two-month stay of the eDome) and create joint products with the help of the PopUp Entrepreneurs instructors. For the general public, information booths will be supplied for an introduction into the topic. Besides this, start-ups regularly display themselves at the eDome and hold public speeches. During opening hours the general public may also visit the students' working laboratories and get a glimpse into the working process of developing a new product.

Secondly, there are the instructors who train students before and during the eDome event. They communicate insights into design thinking, inventive thinking methodologies and hands-on product development, and thereby spread the mission. Instructors also train teachers in contemporary teaching techniques, which enables teachers to spread the concept themselves in the future and become ambassadors of PopUp Entrepreneurs.

Thirdly, the message spreads through student ambassadors and social media activities, moderated by students trained by PopUp Entrepreneurs. Up to two ambassadors per school are assessed and spread the PopUp Entrepreneurs brand vision among their schools, make it well known and organize social media campaigns like entrepreneurial video contests to get students engaged beyond the project course.

Customer Relationships

Relationship management is critical for nonprofit organizations. To ensure the success of the mission and to retain beneficiaries also in the long run, different types of relationships are defined to best cater to the beneficiaries' needs.

Co-creation: To maintain strong ties with private foundations and educational institutions, PopUp Entrepreneurs works closely with both stakeholder types and creates joint ventures in the sense that a direct input from these foundations and institutions into the eDome operations is possible. Meetups will be held on a regular basis, where representatives of PopUp Entrepreneurs, private foundations (for example the Hasso Plattner Institute Potsdam) and educational partners like the Center for Digital Technology and Management Munich, gather together and discuss trending topics in entrepreneurial education to deduct new innovative learning concepts.

Community: PopUp Entrepreneurs will set up an online community to attract schools, get a large audience of students, as well as to assure the engagement of teachers and start-up companies. For teachers, the community offers open online teaching materials, provides a possibility for start-ups to present themselves marketing wise, and also an option to offer internships for students.

Reporting: PopUp Entrepreneurs informs the government and private foundations about the impact of its operations on a yearly basis. The report exhibits the current progress of the non-profit mission and the accompanying vision, captured in surveys and statistics. Over the long run, the immediate impact on the students' development will be monitored and documented.

Key Resources

PopUp Entrepreneurs aims to teach entrepreneurial skills to young students through a combination of teaching in class and hands-on prototyping and testing in the eDome. To achieve this goal, many key resources essential for the operation are identified and categorized as follows:

Physical Resources: The eDome serves as the central hub for PopUp Entrepreneurs. It provides the students with creative space and equipment such as 3D Printers and engineering tools for prototyping their ideas. The furniture, equipment, facilities, and structure of the eDome is considered a key resource and essential for every event across the country. The location of the eDome is considered an important resource as well. Positioning it in central city or near landmark locations ensures higher awareness and recognition from the general public.

Human Resources: Students at the beginning of the program acquire knowledge in basics of entrepreneurship, creative thinking and innovation. The lectures and workshops are delivered by both their teachers and instructors from PopUp Entrepreneurs. Teachers and instructors equip students with different methodologies and guide their personal development as future entrepreneurs. These instructors are essential resources as they collaborate with schools in teaching students and training teachers in achieving the goal. Moreover, experienced speakers play their role in providing motivation and real life examples in the speaker sessions.

Online Community: The online community provides a unique platform to maintain engagement of schools and allow discussions relevant to the program. It allows for different participants such as teachers, speakers, and schools to get in touch and provide valuable feedback on improvements to the program. It also serves as platform for the teachers to discuss content, teaching methodologies and organizational matters.

Key Activities

PopUp Entrepreneurs aims to work closely with students and schools from all parts of the country. The goal is to ignite the entrepreneurial spirit among students from all disciplines and society in general. For this purpose, PopUp Entrepreneurs will keep on moving from one major city to the other. The total duration of a course for students is two months. The first two months are spent by students in classroom work with teachers and instructors as described in key resource section. Then another two weeks are spent in realizing the outcome of the classroom work in the eDome. The key activities can be explained by the figure below.

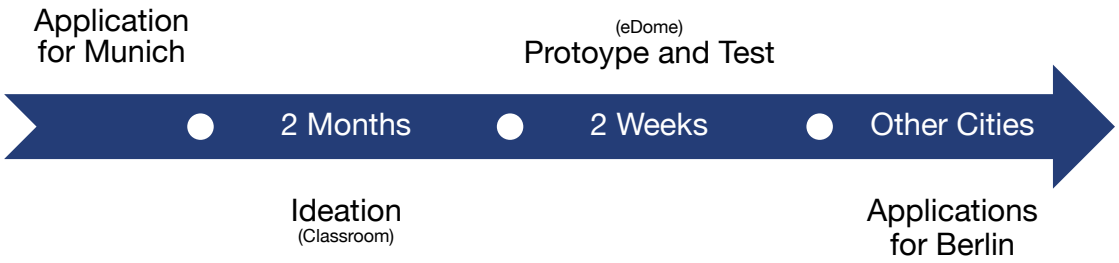
Application: The application process is mostly done online. During the application phase, important information such as city and topic for the ideation phase is disclosed in the online tool. Applicants from different schools and teachers in the network are invited from the particular city PopUp Entrepreneurs is visiting. After finalizing the number of students and dividing them in groups, participants are selected based on motivation and other factors.

Ideation: The ideation phase consists of two months and takes place in the respective schools. Initially, a Kick-off Meeting is organized by PopUp Entrepreneurs during which students and teachers are given an introduction to the program. This includes the roadmap, topic of the ideation phase, available resources and total time frame in which students must come up with the final idea. Teachers are also provided with access to teaching content to guide them in teaching design thinking methodologies to the students. Instructors from PopUp Entrepreneurs also guide and provide teachers with teaching tools required by the program. Students are introduced to tools of design thinking and product development. This is done in form of lectures conducted by their teacher while instructors from PopUp Entrepreneurs help guide the teachers and attend to their questions and queries. The instructors are organized by PopUp Entrepreneurs based on their preferences and experience. PopUp Entrepreneurs will also organize curriculum with consultation of experienced instructors for additional workshops for students conducted during this period. The topics for workshops may include design thinking, the basics of entrepreneurship and ideation. The final ideas by students are selected by teachers and their designated instructors based on innovation value, tools which are available in eDome for prototyping, and potential market. The best ideas from each group will move towards Prototype phase.

Prototype and Test: Students spend the last two weeks of the project course in Prototype and Test phase. This phase takes place in the eDome. The eDome will be made to be equipped with tools such as 3D printers, engineering tools, basic electronic equipment and other raw material required by the students for their implementation of the idea. Creative spaces will also be constructed inside the eDome to provide students with ease and comfort of working.

Activities organized by the PopUp Entrepreneurs include providing technical workshops for the safe use of the equipment and conducting inspiring lectures from experienced entrepreneurs and business people.

Moreover, students often encounter problems and require guidance in managing the prototyping phase. For this reason, PopUp Entrepreneurs will arrange a mentor for each group so that they are properly guided and structured during this phase. Each group is always in touch with their mentor which guides them through realization. Students also get the opportunity to present their ideas to visitors such as other non-participating school students and general public during visiting hours.
At the end of prototype and test phase, final presentations are held by students to fully present their product. Students showcase their innovation and achievement to investors, participating start-ups, and the general public. The final ideas are also showcased on the website for potential investors.



Network Retention: PopUp Entrepreneurs plans to keep close ties with participating teachers who act as ambassadors. This provides the opportunity to keep a network of teachers and instructors who have experience and enthusiasm of teaching entrepreneurship to the youth. Events such as conferences for the training of internal instructors and teachers are identified as key activity. This will lead to an overall improvement of education provided by PopUp Entrepreneurs. Furthermore, organizing dinner events for teachers from different schools allows receiving feedback to both improving the overall program and getting to know personnel who would like to be part of the PopUp Entrepreneurship instructor team.

Fund Raising: Fund Raising activities will be done before each event of PopUp Entrepreneurs application stage. This is done by the Ambassadors of PopUp Entrepreneurs in collaboration with the interested schools. Events such as discussed in network retention are done to raise awareness about the program and its impact. It will also raise funds for the next planned events. The Online Community discussed in key resources also can be used for further fundraising. Other fund raising methods include approaching non-profit organizations with complementary goals and education institutes directly to inform them about the initiative and mission of PopUp Entrepreneurs.

Key Partners

Pop-up Entrepreneurs intends to promote the entrepreneurial mindset among students and society as a whole. In order to be successful with the mission, the foundation looks to partner up with many other institutions and entities which share the same goal. These can be described as follows:

The Government: The German government sees entrepreneurship as one of the most vital education ingredients in its future of development as an economy. "Gründerland Deutschland" is one such initiative by the German government. As the government aims to promote entrepreneurship culture in the country, PopUp Entrepreneurs sees the government as one of the most important strategic partners. PopUp Entrepreneurs aims to work in close co-operation with the government in receiving funding for the initiative and getting the permission to set up the eDome in the prime locations inside the city. The governmental interest in the cause also serves as a marketing support to raise awareness of the initiative.

Educational Partners: Educational institutes like UC Berkeley and TU München which provide higher education in entrepreneurship are also identified as key partners. As these partners see the young prospective entrepreneurs as attractive students, they can provide additional speakers, instructors and educational content valuable for the student learning and motivating them to apply at the respective institution. Similarly, partnering up with other experienced educational non-profit organization, will help train the teachers, and expand the speaker network. These organizations are reached by ambassador marketing, invitations to conferences as part of network retention activities and online community platform.

Foundations: Educational foundations that donate funds and resources for spreading education share nearly the same goal as PopUp Entrepreneurs. Kaufmann Foundation and Stiftung Entrepreneurship by Guenter Faltin are a few examples. These foundations are important partners in providing additional funds both in financial terms as well as resources such as computers, 3D printers and digital equipment.

Accelerators: Europe has seen an increase of accelerator startups. Accelerators such as Boot Camp Startup attract small teams with startup ideas through the application process and support them initially via seed funding and mentoring for a limited time. As these Accelerator companies are looking to invest in young entrepreneurs with ideas, PopUp Entrepreneurs sees them as potential key partners in providing speakers, funding and mentoring for the program.

Revenue Streams

To finance the educational mission and to keep it unbiased from individual interests, PopUp Entrepreneurs aims to collect funds from private foundations with complementary goals. Moreover, the organization aims for German federal government funds and resources from the European Union for the remaining share of the funding sum.

In Germany, there are several philanthropic organizations supporting education. These private foundations offer funding for educational initiatives. Federal Governmental initiatives will provide the remaining share of funds. Several initiatives of the federal government including the initiative "Unternehmertum in die Schulen" from the Federal Ministry of Economic Affairs and Energy are closely related to the purpose of PopUp Entrepreneurs and a willingness to support such under goings by the government is observable. A third source of funds includes European Union calls for entrepreneurial education, in the recent past several large budgets for related purposes, including the Entrepreneurship 2020 Action Plan, were open for calls and the European commission states on several sites that Europe needs more entrepreneurs and innovation. Therefore, hands-on learning is the core activity to foster entrepreneurial "attitudes and behaviours."

Cost Structure

This section describes the cost structure for the Pop-Up Entrepreneurs. The cost structure can be categorized in fixed and variable costs:

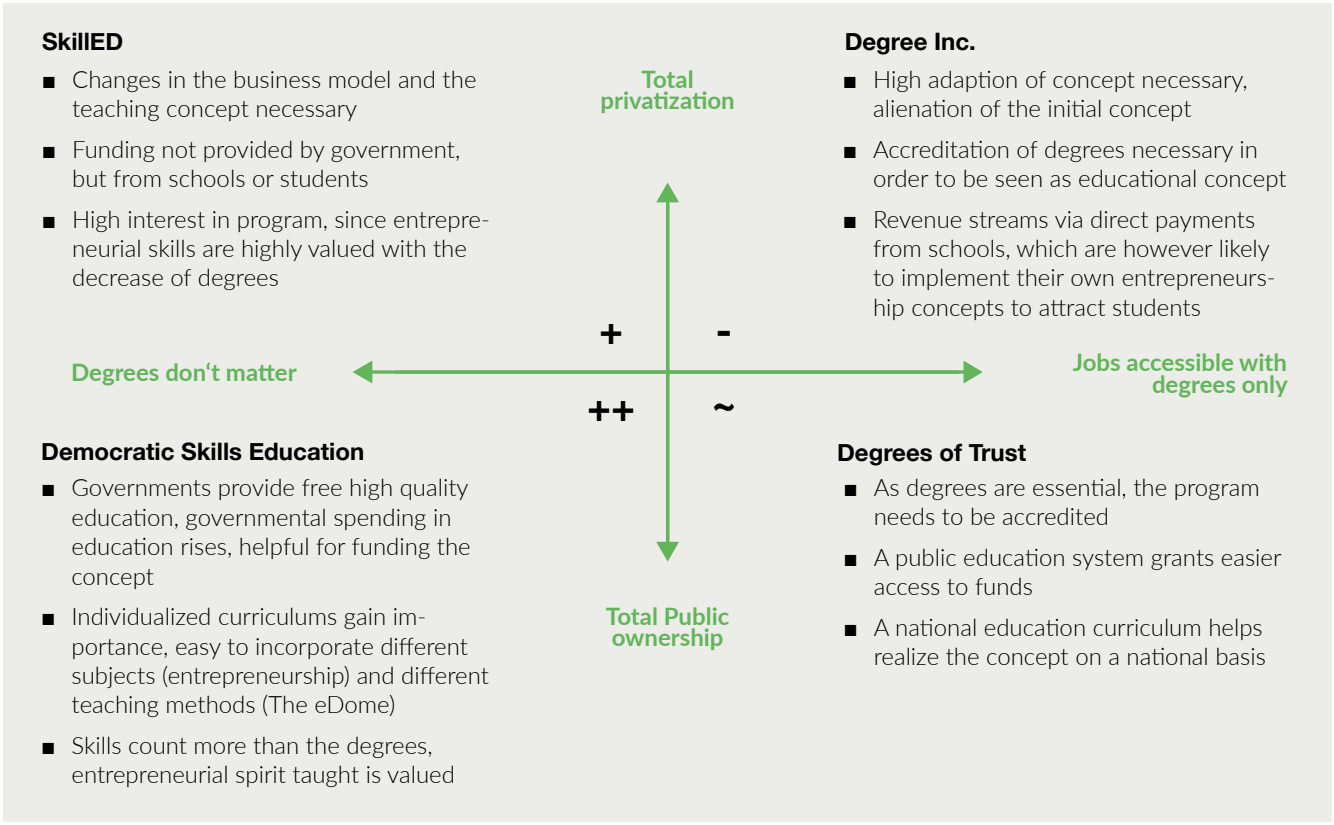
Fixed Costs: As much of the main activity of the young entrepreneurs is focused on working together in the eDome, much of the fixed costs consist of the design and construction of the eDome. This will require hiring of architects and construction experts to build a transportable structure that can be set up in various cities. This will also make up the biggest upfront cost in starting the program. A second considerable fixed cost includes the creation of teaching content taught in schools. Content creation is done by Pop-Up Entrepreneurs itself. These costs include research and development to create interactive and engaging content useful for both teachers and students in achieving the learning outcomes.

Other major costs include creation and maintenance of the website. The website is required for application and recruiting, distribution of teaching content, and marketing. This requires hiring a team of web developers. However, some IT Staff will be required indefinitely for its maintenance as well.

Variable Costs: Variable costs mostly include costs that are required in performing the key activities. The costs include transportation and setting up of the eDome in the city. However after the setup, additional costs incurred are renting equipment and raw materials required by students during the prototype phase. These costs are a major part of each successful event in the city.

For human resources, instructors are required to work with schools in teaching young entrepreneurs. The running costs associated are transport and accommodation of the instructors in each city along with their contractual wage. Similarly, transport and accommodation costs for guest speakers can additionally be incurred. Apart from the key activities, some costs are also associated with fundraising and marketing. This would require hiring of some administrative and marketing staff. Furthermore, as described in key activities, networking events and training conferences for instructors and teachers are required to improve the overall quality of education provided by the PopUp Entrepreneurs. Organizing such events has a costs such as the rent of the event location, food and decoration.

Scenario Fit



Degree Inc.

In case of an entirely privatized education system in combination with a high focus on degrees, the concept of PopUp Entrepreneurs faces major challenges.

The overall teaching concept would have to adapt to the fact that all educational institutes need to give out certified degrees in order to be valued highly in the students' and the public opinion. As PopUp Entrepreneurs aims to spark the entrepreneurial spirit in students rather than giving accredited certificates, it would be challenging to adjust the concept accordingly.

Additionally governmental educational funding ceases, since the whole educational system is privatized. This leads to a shift of revenue streams towards direct payment of schools for the program. However, schools would probably implement, on their own, a similar teaching concept to their accredited curriculums than paying for an external, non-accredited service like PopUp Entrepreneurs.

Consequently, it might be possible to adapt the concept of PopUp Entrepreneurs towards these conditions, however the final product would probably be very different to the original idea of fostering the entrepreneurial thinking among students and the whole society.

Degrees of Trust

With some adaptations of the concept, PopUp Entrepreneurs could also work in a scenario in which education is completely public and students are primarily motivated to study in order to attain a degree.

The biggest adjustment necessary to make PopUp Entrepreneurs work, is an accreditation of the concept in order to provide degrees for participation. If the concept gets officially accredited and degrees can be given out, schools as well as students would be interested in participating in the program and thus extend their curriculum with hands-on entrepreneurial training.

If the changes are implemented, access to governmental funds should be feasible.. Another advantage is the national standardized educational system described in the scenario. As PopUp Entrepreneurs is a nationwide concept, it would be easier to implement in one unitized national education system, rather than adapting it to single federal systems.

Democratic Skills Education

A scenario in which education becomes completely public would be very favorable for the concept of PopUp Entrepreneurs. Since governments are entirely responsible for financing the education system, the overall budget for education rises. Receiving funds for projects like PopUp Entrepreneurs therefore becomes easier. Hence, the concept fits into the educational mentality of this scenario: students are taught skills, rather than working for a certificate. The entrepreneurial spirit that rises with the participation in PopUp Entrepreneurs is highly valued in society and industry.

An individualized curriculum for each student, as proposed in the scenario, additionally eases the realization of the program. Schools try to offer a variety of different courses to different students and entrepreneurship could become an accepted subject within individual curriculums. The described flexibility of curriculums and attendance of students helps to realize a two-week full time workshop in the eDome, without the risk of pupils missing out on other subjects in the meantime.

SkillED

Incorporating some changes to the business model and teaching concept, the scenario of a completely privatized education providing a skills-based education, still offers a good basis for PopUp Entrepreneurs.

The biggest adaptation needed concerns the revenue streams, which would no longer derive from funding by the government, but either from schools, which pay directly for the service, or from students who want to participate in the program.

However the interest in the program, of both schools and students still exists as PopUp Entrepreneurs offers a unique teaching concept of entrepreneurial skills. As there is no focus on the certificate received, PopUp Entrepreneurs adds an outstanding achievement in the skills-based curriculum of students.

As described in the scenario, the education material for each student is provided by different sources. This could also enable PopUp Entrepreneurs to act as teaching institute itself, providing entrepreneurial education discretely, rather than forming partnerships with existing schools. The theoretical study material and instructed classes might be provided online and group work, such as ideation, could be organized online as well.

Challenges

- Developing a community/network of eDome alumni
- Getting government on board for funding and permissions for space in cities
- Finding highly motivated school teachers
- Adjustment of activity in students' regular study schedule

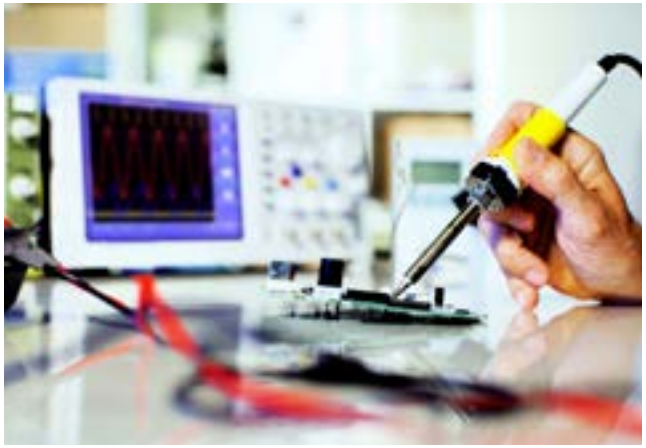
Outlook

In the future, PopUp Entrepreneurs could, on one hand expand their engagement in Germany aiming at medium sized cities and on the other hand expand the operations across different countries in Europe.

The aim would be to retain people in the network and grow it further, which will eventually be achieved by a self-running decentralized network in place as a platform for the community to interact. For teachers, this will mean PopUp Entrepreneurs is not just a school class, but an integration into a community of similar mindsets and good connections.

As PopUp Entrepreneurs grows further and becomes better known among different partners, it could get independent of the government funding and develop a financial base of sponsors by partnering up with new entities.

Today, the start-up landscape is emerging more than ever before. Governments are spending an increasing amount of money to encourage students to work on new business ideas. This potentially can lead to PopUp Entrepreneurs having a much bigger impact on society. A more active start-up landscape across the country would emerge eventually and there could be more successful entrepreneurs than ever before.



Irman Abdic, Fabian Frank, Julian Roos, Maximilian Strobel

Lecture Lytics

Supporting to continuously monitor and improve lecture quality

Illustrated by the Institute for Innovation and Change Methodologies

LectureLytics offers a combination of a hardware device and a software platform in order to monitor and improve lecture quality. It covers the whole value chain beginning with measuring and analyzing the lecture quality up to feedback and coaching.

As a first step, the attention rate of the audience and specific presentation parameters such as speaking speed or intonation of the lecturer are measured via various tracking tools such as microphones and cameras. Intelligent algorithms and machine learning correlate the gathered data in order to find insightful coherences. Subsequently, the measured parameters are used to give real-time feedback and coaching to the lecturer during lecture sessions in the form of an attention "heat map" and pop-up suggestions. Additionally, LectureLytics provides post feedback functionalities that let the user analyze historical attention rates of lecture sessions or single slides. In a last step, value is added by post-coaching the user on rhetorical skills as well as on slide and overall lecture design.

LectureLytics primarily addresses universities as key customers since lecture quality is of high relevance for them. The technology provides universities with as yet missing tool both actively control and measure lecture quality. However, LectureLytics is a weighty investment and therefore close personal relationships with customers need to be built. LectureLytics has been designed to analyze data and continuously improve through machine learning techniques for better results. Therefore, a significant upfront investment in research and development of algorithms is needed. In addition, several partners must contribute to the success of LectureLytics. Therefore, we use external hardware and IT infrastructure providers.

LectureLytics creates revenue in different ways. The hardware component is sold for a one-time fee, whereas a subscription-based monetization enables users to use the functionalities of the online platform. Additional add-on assets and features are sold via the online store.

Business Model

Key Partners

- Hardware manufacturers
- IT infrastructure providers
- External experts for education and coaching
- Associations of educational institutions and lecturers
- Well known speakers and event organizers

Key Activities

- Product development
- Improving the prediction model by machine learning
- Cleaning and organizing collected data
- Managing the network of lead customers and users

Key Resources

- Highly qualified and specialized staff
- Initial R&D budget
- Specialized recording technology that allows data to be anonymized
- Trained machine learning models and the collected user data

Value Proposition

- Transparency of lecture quality
- Improvement of lecture quality
- Improvement of lecturer's presentation skills
- Long-term cost reduction for educational institutions
- Increase of reputation of the institution
- Real time and post-lecture feedback based on data analysis
- Virtual coaching based on automated recommendations

Customer Relationships

- Annual analytic reports
- Telephone support for technical and user issues
- Regular interaction with the virtual coach
- Q&As and forums
- Newsletter with valuable new insights
- On-site introduction courses for new users

Channels

- Initiate and participate in public tenders
- Direct sales by approaching educational institutions
- Online sales of additional hardware parts
- Purchasing additional software features through online platform

Customer Segments

- Educational institutions and their lecturers (professors, assistants, students)

Cost Structure

- Large upfront investment for initial product development
- Continuous research and development
- Hardware manufacturing
- IT infrastructure
- End-user training

Revenue Streams

- One-time fee for the hardware component
- Selling modular components in different quality levels for different purposes
- Subscription for basic features of the online platform
- Freemium for additional or new features of the online platform
- Customized packages for universities
- Software only product

Customer Segments

Educational institutions: LectureLytics is applicable in a range of situations. However, some use cases are more promising than others and the initial focus is set on the large customer segment of educational institutions such as universities.

Educational institutions bring several advantages. First, they can be tackled in a big scope by going over the ministry in charge for the according state. Even if only one university is approached alone the potential customer base is still quite big since several large lecture halls can be taken into consideration that potentially could be equipped with LectureLytics. This scope gets even bigger when you take into account actual users of the tool in the context of universities or other educational institutions are manifold. Most certainly, the professors of the institutions will use the tool, but so will assistants and other teaching experts. Even students might use it in certain situations, for example, when making a final presentation in front of the class.

The usage in big lecture halls is helpful for the initial phase of LectureLytics because those rooms are standardized in terms of size and layout. The tracking tools of LectureLytics can be calibrated to one of them in the beginning and just be used in other settings as well without major changes. As soon as they are successfully implemented in one university, others might pick up the trend when they see how well it works and set up their own system as well.

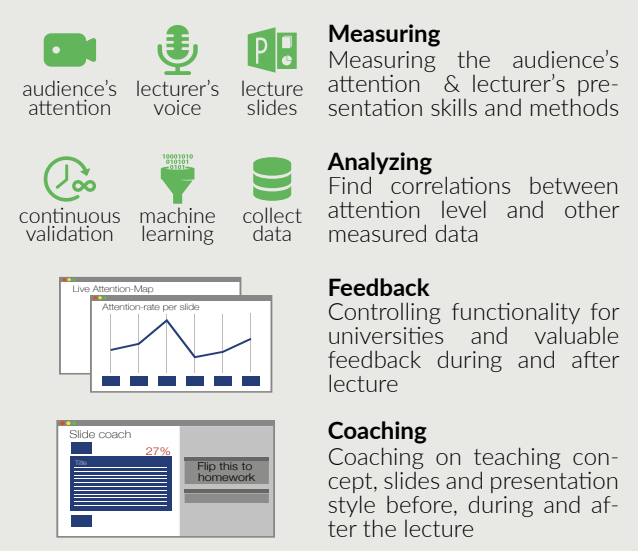
Long-term customer segments: In the long-term, companies are also a reasonable customer segment. Potential buyers are corporates and consultancies. Consultancies might want to use the tool for improvement of their presentation skills, which is an essential skill for their line of work. Even though presenting is not the key value of big corporates, they still might want to incorporate the tool within their corporate education program or use it in different situations like smaller workshops or bigger lectures internally. However, these settings are very flexible and cannot be easily seized by having one fixed and calibrated adjustment. In the long-term, the tool should be able to adjust to flexible variables by itself.

The same applies to the market of individual customers. LectureLytics offers some unique value, which is also handy for individuals who want to improve their presentation skills. However, those situations are even more flexible than the corporate context, and therefore it is only possible as a future customer segment, focusing on educational institutions for the start.

Value Proposition

LectureLytics is a versatile educational product, which aims to improve the quality of lectures by measuring the attention rate in class, analyzing speech characteristics of the lecturer, giving recommendations on the lecture quality in real-time and automated coaching of lecturers in a virtual environment. In addition, it estimates the overall quality of lectures and provides objective comparison of lecturers on a university level and worldwide on the basis of state-of-the-art engineering. LectureLytics is mounted on top of the lecture table, where it collects audio and video data about the audience and the lecturer. It anonymizes the raw data and sends it to the online service via an encrypted connection, where all data is collected and analyzed instantly. Suggestions for improvements are streamed through an online platform and visualized in a structured way so that lecturers can read them on the fly during the lecture. After the lecture, all data is available for post-assessment and review. In a review phase, lecturers are able to navigate through the lecture and reflect on points of improvement.

LectureLytics provides great value to anyone who wants to improve his or her lecture quality. Thereby the value proposition can be split into two big parts, 1) the institutional level and 2) the individual level.



Institutional level: To start with the values on the institutional level, using LectureLytics gives a university the unique opportunity of gaining transparency and knowledge of professor lecture quality. This is normally attempted through conducting surveys with students to find out about the quality of the lecture afterwards. However, this feedback is not very specific and since there is a lack of real motivation for the students to take the survey seriously, the results are rather generic and might not represent the real situation. By using LectureLytics the university has the ability to directly assess the quality of the lecture by comparing attention rates and rhetorical performance of the lecturer to benchmark values or other lecturers in a long-term perspective.
In having the measures to compare and assess the quality, the next possible step facilitated by the tool is to improve the lecture quality. In comparison to the generic feedback student surveys produce, LecureLytics can provide concrete recommendations for further actions or set future goals for lecturers. In a mid-term perspective, an incentive-based salary model for lecturers and employees of the university based on the findings of the tool is possible. Lecturers who are not performing according to these requirements can be notified and a dialog about the reasons can be held with the employee. Thus, LectureLytics can serve as a controlling tool for universities.

This improves the lecture quality, but also leads to a better perception of the university as a whole. Thus, student and public opinion might increase, leading to an improved image of the institution. A side effect is that paying a flexible bonus based on actual performance and replacing continuously underperforming lecturers can reduce costs.

Individual level: Looking at the values of the individual using the tool, a huge motivation is the personal skills assessment. LectureLytics leads to a strong improvement of presentation skills of everyone who uses it. Two crucial components accomplish this: feedback and coaching.

In this context, feedback encompasses many components of the lecture. Assessing the attention of the audience, the quality of slides and the rhetorical skills of the lecturer, several points can potentially be improved. The feedback presented in real-time during the lecture focuses on parts that can immediately be improved. For example, the attention of the audience

is presented as a percentage number, while a "heat map" showing which sections of the audience have high or low attention rates. Aggregated information is available after the lecture. This is very valuable for reflecting upon the lecture.

Coaching on the other hand includes everything related to recommendations. The tool tries to find correlations between information related to attention and variables of the lecturer. It gives real-time coaching during the lecture in the form of recommendations like "speak slower and louder" to tackle dropping attention. If the attention rate is very low, a short break might also be recommended. The post-lecture coaching focuses on those parts that are changeable, but need some more reflection and effort. Thereby, these recommendations tackle rhetorical skill improvements that cannot be implemented immediately, but rather need some practice. Implementing small breaks into the speech and working on the pitch might be some examples. It also works on improvements of the slides. Through having some academic knowledge plus continuously improving the database, LectureLytics is able to derive improvements on the slides that might not be immediately obvious. The tool does so by trying to correlate all the collected information with the audience's attention level and thus determines which slides are good and which are not. Technical slides might be too detailed for class itself and the tool might suggest to flip it to self-studying at home. The slides will also be assessed on if the number of breaks is sufficient and if a group task might be helpful at some point. By giving feedback on the one hand and coaching on the other, the presentation skills of a person will increase within a rather short time frame.

Channels

Channels for educational institutions: The preferred channels are very much determined by the customer segments. Since the focus is on educational institutions for the beginning, the channels need to be adjusted to that situation. Most educational institutions are public and use public money to buy equipment, which is classified as a rather large investment. Therefore, they are forced by law to conduct tenders to buy such equipment. A consequence for LectureLytics is that the market must be entered by taking part in tenders. However since LectureLytics is not a basic product universities usually purchase because there is nothing elaborated like it out there yet, it is unlikely that a tender for a platform like LectureLytics would be conducted. Therefore the institutions need to be approached directly and a direct sales strategy needs to be used. By convincing them of LectureLytics directly, tenders can be initiated and despite some competition, it is very likely LectureLytics would win because the value it offers is unique. Therefore universities and other educational institutions are reachable via this two-step strategy.

Since the hardware component of LectureLytics is modular, selling of additional parts to upgrade the hardware is crucial. Better cameras, microphones or other parts can be bought online on the platform and can be easily plugged into the existing hardware component. This channel then also can be used for selling replacement parts.

Additional channels for long-term customer segments: In a long-term perspective, for corporates and individuals, LectureLytics has to be accessible through more channels. As soon as the brand of LectureLytics has some reputation and is well known on the market, online sales for selling the product itself will make sense to reach a broader customer segment and to scale sales. Individuals probably will inform themselves online and most likely will buy access to the platform online.

Affiliate sales are another possible channel. The hardware component would be sold to fair centers who can then sell a subscription to fair organizers and speakers. In the corporate context, fairs could use the tool for presentations on the fair itself. By using it and showing how well it actually works, this might also attract visitors from companies to get the tool themselves. The fair could then have the opportunity to sell the platform directly to interested parties.

Customer Relationships

Universities and other customer segments consider the LectureLytics product a long-term investment. In addition, the hardware of the product including various microphones and cameras is complex and requires on-site installation and maintenance. Therefore, it is necessary to establish a close relationship with prospective clients as well as to offer personal assistance and professional customer service. A strong relationship is built by use of various functions and instruments.

A close customer relationship is ensured from the very beginning by conducting introduction courses for new users on-site. Additionally, LectureLytics offers online introduction videos to help users become acquainted with the different tools and functionalities of the platform.

A strong tie is especially created with the virtual coaching, which can be conducted after every lecture. In providing feedback and coaching on a very regular basis, LectureLytics is not only regarded as a product but a real partner. To enrich this perception, LectureLytics not only publishes annual analytic reports for each individual user but also on the broad level of the customer base of the platform. In addition, they get informed about the latest findings that Lecturelytics gains from big data analysis.

Since the tool is a combination of hardware, software and customer interaction, technical problems cannot be totally prevented. Therefore, a support service is provided to approach potential technical problems and to be as close to the customers as possible. This support does not only take calls about actual problems with the tool, but also offers user support on any issues the customers might have. On top of that, a Q&A-forum is offered where employees actively answer questions and give advice.

Since LectureLytics is used by individuals – even though a university might buy the whole system – a forum is integrated into the platform to enable users to exchange best practices about the handling of the tool or to discuss new ways of lecturing and presenting. Since the analytic reports are only published once a year, LectureLytics will also offer a newsletter service that comes every second month and which informs the users about recent changes on the platform and new findings from the database analysis.

Key Resources

To successfully bring LectureLytics to the market four key resources are required as described in the following paragraphs: 1) highly qualified and specialized staff, 2) an initial R&D budget, 3) specialized technology to anonymize data and 4) especially in an expansion and stabilization phase of the company, the trained machine learning models and the collected user data.

LectureLytics' value for the customer is mainly created by intelligent and sophisticated machine learning software that generates knowledge out of the data recorded by the hardware. Therefore product development requires a strong team of data scientists, machine learning experts, and software engineers, who can build the software in-house. Also, experts in the application domain of education and psychology are required, who can understand the learning process, behavioral patterns, the concept of attention and how they are reflected in linguistics, gestures and motion. They have to train the machine learning models to give fruitful suggestions to the customer of LectureLytics. Furthermore hardware engineers and designers have to create the physical component of the product based on purchased subcomponents.

This research and development process and the appropriate staff have to be financed. Therefore, especially in the initial phase of the company, it is essential to have access to an adequate budget.
As LectureLytics will collect a massive amount and variety of data about individuals, such as gestures, facial expressions, emotions, eye focus and further meta-information that can be associated with the person's identity, specialized anonymizing technology is also a key resource. This is particularly important due to special regulations and laws our customers in the education market have to fulfill. For this reason, the data has to be transferred into an anonymized, intermediate representation to allow analysis afterwards. Therefore, special hardware technology, such as a camera with processing power to directly perform this requirement, such as the Fraunhofer INCA camera should be available at the beginning of the development process.

Especially in an expansion and stabilization phase of the company, LectureLytic's suggestions for the teacher have to be optimized and improved to outperform potential competitors and increase the customer's value. The key resource to do so, is the collected data and appropriate machine learning algorithms. Their value is increasing, which means that the accuracy of the suggestions can increase. Therefore they are the core of further developments. Additionally they represent a high entry barrier for potential competitors, who do not have an established database.

Key Partners

LectureLytics' key partners can be grouped into two sections. The ones who are essential for developing and building the actual product and the ones who can be beneficial for reaching the intended customer segment.

The most important partners are hardware manufacturers. Manufacturing the hardware component in-house would pose a significant barrier in terms of required investment for machines, people, know-how and space. Especially because manufacturing can only be done economically when scale effects are used, which will not be possible in the beginning. Therefore this has to be outsourced and LectureLytics has to establish a strategic partnership with a manufacturer that has the expertise and the resources to deliver in a sufficiently high quality and quantity.

Additionally, LectureLytics relies on having a partner, who can provide a reliable IT infrastructure as a means to the platform-as-a-service. Due to the usage peaks during lecture times, the demand for resources will significantly increase at daytime and decrease accordingly afterwards. Therefore the partner has to be capable of scaling up or down quickly. In order to provide the best experience, the platform has to be distributed and data centers have to be close to the location of users due to the local privacy regulations and communication latency. Investments in building own data centers would have colossal implications on the price of the product and it would be difficult to amortize all costs that arise. Thus, LectureLytics has to partner with IT infrastructure providers, which will charge only for spent resources and make it easier to scale and amortize costs.

Even though we plan to have experts with a background in education and psychology within the company, co-operations with external experts in this field are still necessary to gain credibility and evaluate the performance of the product further. The best coaches on presentation need to be examined and their best practices need to be integrated into LectureLytics.

Partnerships with highly recognized personalities can also be beneficially used for marketing and sales if their knowledge is incorporated into the product. Additionally, LectureLytics aims to partner with governmental and non-governmental customers and user associations for teaching, learning, coaching and education improvement. Awareness of the product has to be built and associations will help to introduce LectureLytics to the most active customers and establish a network for further activities to reach the rest of the community.

To build awareness of the product, not only associations have to be approached, but LectureLytics has to be presented at big national and international events, where the broader public can experience it. Therefore partnerships with well-known speakers or the organizers of big events could be made.

Key Activities

Just like the key resources, most key activities are related to the product development process.

The value proposition of LectureLytics is mainly the continuous analysis and suggestion functionality. Therefore the key activity of LectureLytics' key resource - the highly qualified staff - is to initially develop the platform, the machine learning algorithms and to train the models as described in the key resources section of our business model canvas. Also the IT infrastructure has to be designed and implemented, which will be based on a purchased platform-as-a-service solution and has to be capable of handling a huge amount of real-time information to provide recommendations instantly.

The collected amount of data will grow over time and it will become one of the most important resources as it will enable the discovery of new patterns and correlations between different measured variables like rhetorical attributes of the lecturer, slide characteristics and the attention level. To achieve this, a new field of activities will be necessary, as the data might be unorganized and biased. Therefore it has to be categorized, tagged and cleaned. The importance and extent of this activity will grow with the amount of data.

Also, activities related to sales and customer contact are important for LectureLytics because it strongly depends on the number of lecturers who use the product and the technology acceptance within the staff. This is due to the fact meaningful analyses and predictions can only be made once on a critical mass of useful data has been attained. Therefore lead users have to be identified and trust in the product must be built by increasing the engagement with customers. Some potential measures can be free presentations or guided trial periods.

Revenue Streams

Revenue is primarily generated by a low one-time fee for the hardware and a subscription fee for the analytics platform. For both, the customer can modularly configure the product based on his needs. Additionally we will negotiate contracts for customized bundles for customer with high sales volume. Also, an entry-level version that can be used without hardware will be available.

Charging a one-time fee for the hardware component will create a kind of lock-in effect for the customers, as our customer would generate sunk costs when he changes to a competitor's product. But the fee will be lower than its actual costs, because it should not create a barrier for potential new customers.

The hardware component is assembled with a decoupled set of sensors, which will make the replacement of faulty parts or the upgrade respectively the downgrade of the product easier on a plug-in and plug-out basis. This is not only important for maintenance, but also for the pricing itself. For smaller lecture halls, clients will be able to buy a cheaper version with a camera that has a lower resolution and fewer microphones. In the case that the customer buys a cheaper version of the hardware component and decides to upgrade any part later, additional parts for upgrading will be offered for a fixed price.

Besides charging a one-time fee for the hardware components, the main part of the revenue is generated by a subscription-based model for the online analytics platform. Customized packages with pre-selected complementary basic features and trials of new features, which will expire after a certain period of time or turn into subscription (Freemium) will be offered. The price for the subscription will be determined by the selected features, number of users and subscription period.

Lead customers have to be offered special discounts and individual offers have to be negotiated with customers with high sales volumes. Therefore bundles can be created, such as giving the hardware component for free and signing a subscription contract for two years, or selling the hardware component on a rental basis.

Certain features in the online platform, such as coaching on presentation slides do not require the hardware component when the LectureLytics network has already collected enough data to run the machine learning logic. This functionality could be either monetized independently by selling it as an entry-level version of LectureLytics or could be part of special discounts. For instance universities, which choose to equip all lecture halls with the hardware components of LectureLytics will get the software-only version for free. This includes free access for students with university email addresses to all features that do not require the hardware component.

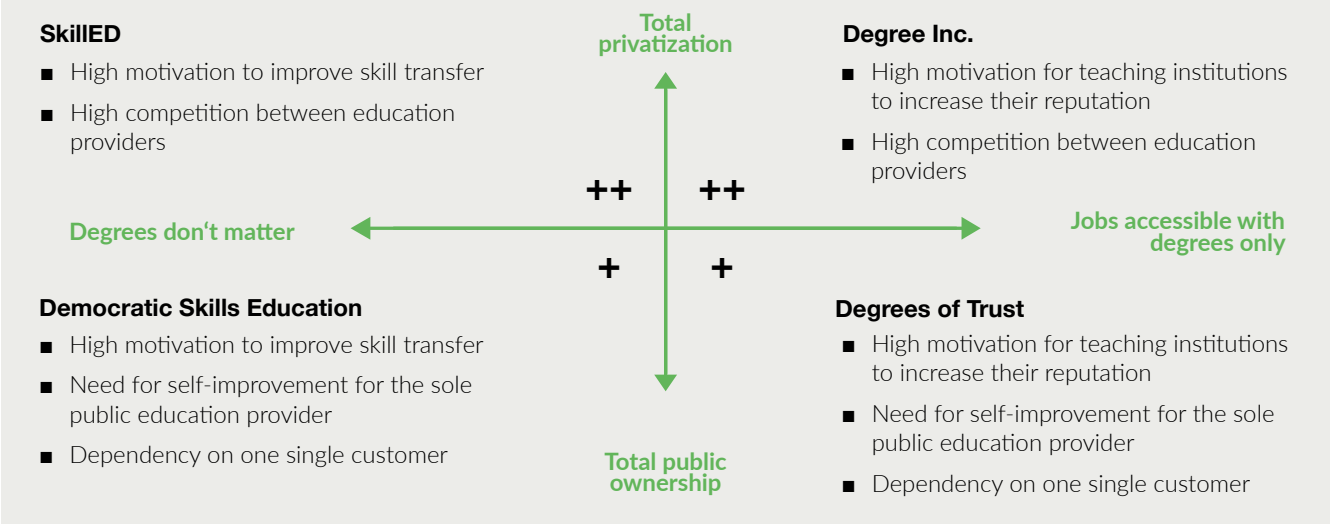
Cost Structure

Designing the hardware component and building the distributed online platform, which is based on sophisticated machine learning logic, is a personnel and time-consuming process. Especially because the staff needs to be highly qualified, as already explained in the key resource and key activities section, it is also cost consuming. These expenses are mainly staff costs, as this will be done in-house.
Therefore a huge upfront investment is needed for product development. Also after the initial phase continuous research and development activities have to be financed, as they are vital for the further progress.

Key partners allow LectureLytics to focus on the core business and allow for scaling the business faster. Therefore, hardware manufacturing and IT infrastructure still constitute a considerable portion of costs. Manufacturing costs depend mainly on the quality and location of the production. The main cost drivers are hardware parts, testing, priority, packaging, delivery speed and staff costs at the manufacturing location. The IT infrastructure costs for the platform-as-a-service solution depend on the bandwidth usage, consumption of resources, geographical location, IT architecture requirements, storage space and other special hardware requirements and services needed.

As LectureLytics will be used by a wide variety of users with a different background, training personal is required to show the end-user how to use LectureLytics effectively. Additionally, a sales team has to be financed, even though this is only a minor part in the overall costs.

Scenario Fit



SkillED

In a totally private education landscape, where education is financed completely by companies and/or students themselves, a very competitive market will evolve. Each education provider is therefore trying to gain reputation among students and companies through a high value proposition to ensure costs of financing.

When degrees do not matter at all and the focus is on obtained through skills, the value proposition highly depends on how and which skills are sought. LectureLytics as a tool for enhancing teaching methods is valuable for private education providers and can also be used as a marketing tool. In comparison to a single public customer, the willingness of private teaching institutions in a competitive environment to spend money on their unique selling proposition is higher and price sensitivity is lower, because it is crucial for their continued existence. Additionally, from the entrepreneurial point of view of LectureLytics, a higher amount of potential customers makes the entrance of new players to the market easier. Overall, this scenario offers very positive prospects and brings no real difficulties. Especially the focus on skills leads to a strong fit for LectureLytics.

Degrees of Trust

In a totally public education landscape, the state is the only provider of education and a competitive market does not exist. Due to the lack of competition, a state has to keep the motivation high by itself to hold and continuously increase the quality of the education by internal measures, as this has a direct effect on the country's prosperity in the future.

In this scenario, degrees provided by the state have a huge value. Employers are particularly interested in high grades. It means that the trust in the validity of grades is already high and they appropriately reflect the obtained qualification. To maintain this situation and the quality of education, a product like LectureLytics can be valuable for the state in a long-term view.

In contrast, from the point of view of LectureLytics as a potential startup, there are a few points to be considered: the sole public education provider as a single homogenous customer group has a powerful bargaining position, is often limited in the budget it wants to spend and represents high entry barriers for small companies because of complicated and there are slow purchasing processes. Overall, in this scenario, LectureLytics needs to emphasize the benefits for the public sector. If LectureLytics does this successfully, a quite good fit is achievable.

Democratic Skills Education

In the event of a totally public education system, the state is the only provider of education, implying that a competitive market does not exist within this context. Due to the lack of competition, the state itself has to keep the motivation for good education high in order to maintain and continuously increase the prosperity of countries in the future.

The lack of diversity of educational institutions in this environment also drives the fact that degrees are not important, because there are no differences in the reputation of the signing institutions. Therefore, the focus lies on teaching real skills which are required for the job.

A product like LectureLytics, which can increase the efficiency and effectiveness of skill transfer and which generates motivation for lecturers to improve themselves would be valuable for the state as education provider. In contrast to this, from the point of view of LectureLytics as a potential startup, there are a few points to be considered: the sole public education provider as a single homogenous customer group has a powerful bargaining position, is often limited in the budget it wants to spend and represents high entry barriers for small companies because of complicated and there are slow purchasing processes.

Overall, this scenario offers some positive prospects but also brings some difficulties. The fit for LectureLytics therefore is tendentiously positive but LectureLytics still must put in some effort to be successful.

Degree Inc.

In a totally private education landscape, where education is financed completely by companies and/or the students themselves and the reputation of the teaching institution is of major importance, a very competitive market will evolve. Each education provider will therefore try to gain reputation amongst students and the wider public through a high value proposition to ensure financing.

If degrees are highly important for potential employers, the value proposition of the teaching institution is mainly reputation. The development of reputation in education can be significantly supported by long-term success of the students in their future career and investment in new technologies to improve the education.

A tool like LectureLytics, which can improve the quality of lectures and the education as a whole, can therefore be used to increase students' success in a long-term view. Also, it can be very valuable for marketing purposes to increase the reputation of teaching institutions. The willingness to spend money on their value proposition is higher and price sensitivity lower for private institutions, because it is crucial for their continued existence.

Additionally, from the entrepreneurial point of view of LectureLytics, a higher number of potential customers makes the entrance of new players to the market easier. Overall, this scenario allows a very positive outlook and brings only minor difficulties. The fit for LectureLytics therefore is promising and LectureLytics should be able to be successful.

Challenges

- Getting customers to trust the product and buy it
- Development of the software, design and development of the hardware, maintaining the platform and responsibility for hardware failures
- Privacy of the audience and data security
- Finding the partners for producing the attention tracker hardware and the IT infrastructure
- Developing the expertise for the presentation evaluation and recommendation
- Getting an investor for a huge upfront investor
- Trend towards e-learning is leading towards a decrease in presence lectures accompanied by a trend towards really small class sizes

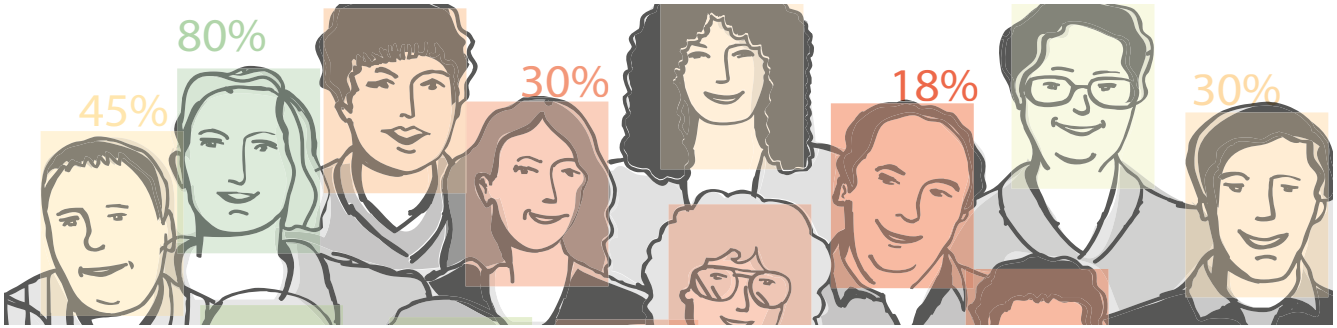
Outlook

In the long-term, LectureLytics will offer a platform that covers the whole value chain of the lecture improvement by offering various complementary functionalities.

LectureLytics not only reacts to new trends but proactively takes part in this innovating process as a pioneer. Accordingly, LectureLytics encourages its clients to use new and innovative lecture concepts by providing corresponding tools on the platform.

The vision of LectureLytics is to become globally used by universities and educational institutions, whether private or public, in order to actively monitor and improve lecture quality. Additionally, LectureLytics aims to expand to non-educational market segments, as consultancies or multinational corporations and become a commonly used tool for assessing and improving rhetorical skills, presentations and speeches.

Over the years, LectureLytics will collect a colossal amount of data that links historical attention rates of lecture sessions with their individual lecture design and rhetorical techniques of the lecturer. Through this database, the tool will be able to predict and assess potential attention rates of lecture sessions in advance. Likewise, the knowledge of LectureLytics' experts is used to improve the coaching applications. The knowledge gathered from the accumulated data will be a pivotal resource for LectureLytics and therefore will serve as a strong competitive advantage against current competitors and pose a powerful barrier for new market entrants.



Edu Island

An online platform for schools that fosters offline time and increases the learning motivation

Illustrated by the Institute for Innovation and Change Methodologies

Edu Island revolves around the idea of offline time from phones. Targeting school students from ages 9 to 14, Edu Island allows a class to build a virtual island in an online game.

This happens through earning Kachings, the Edu Island Currency. The longer the students don't touch their phones in class (as recognized by the app), the more Kachings students earn. The more Kachings collected, the better the class can develop the island through trading Kachings for inhabitants, buildings or animals. Additionally, teachers are able to upload quizzes through the app and give students another opportunity to earn more Kachings. At the end of every half school year, classes can compete with each other based on how well developed their island is. This gamified inter-class competition is supposed to enhance students' motivation in participating in the game.

Penetrating a rigid market that is mostly publicly funded, such as the German school system, is a challenge. As the target users are students aged from 9 to 14 and their teachers, the customers Edu Island approaches are the actual schools and the principals because they have budget sovereignty. Once, the product is established in the current target group, a challenge will be how to transfer the application to a class environment made up of older students.

A crucial part of Edu Island's business model is partnerships with publishing houses. They are approached in order to receive professional content, which is then provided to teachers in the form of quizzes. Another benefit of partnering with them is that they are already established in a slowly developing education market- encouraging Edu Island to be perceived as a serious platform.

This highly engaging app, available both on mobile devices as well as on a web platform, can therefore help a school achieve better results regarding the learning process. Moreover, it enhances student's engagement in class and creates a healthy and motivating competition amongst classes. For teachers, Edu Island represents an easy platform to keep students engaged and a good way to monitor and test a class.

Business Model

Key Partners

- Publishing houses as content providers, marketing channels, and integrity signals

Key Activities

- Acquiring the publishing houses as partners
- Finding teachers as ambassadors

Key Resources

- Quizzes created both by publishing houses and teachers
- Higher user base creates more attractiveness for publishing houses
- Ambassador teachers as an interface between Edu Island and its users

Value Proposition

- Higher learning success for school students
- Improved focus of students in class and educational quizzes for students
- Staying away from phones means success in Edu Island
- Time-efficient online classroom management for teachers

Customer Relationships

- One Edu Island ambassador per school (a teacher) as first point of contact
- Set-up service and introduction workshop for Edulsland ambassador
- Creating a help and exchange forum for teachers

Channels

- A direct system where sales force approaches local schools directly
- Promotion at fairs such as Didacta, Europe's biggest teacher fair
- Word of mouth and demo videos for a hands-on experience of the product
- Publishing houses as partners promoting the app

Customer Segments

- Schools and their principals as actual paying customers
- User base consisting of teachers and students in grades 4-8
- Focus initially on North Rhine-Westphalia, Bavaria, and Baden-Wuerttemberg

Cost Structure

- Product development
- Marketing costs
- License fees for content from the publishing houses

Revenue Streams

- Semi-annual subscription fee based on the number of participating classes
- Discount for more participating classes per school
- Penetration price strategy

Customer Segments

As far as Edu Islands' customer segments are concerned, a differentiation has to be made between the paying customers, i.e. the people at institutions who pay for the app, and the user base. The paying customers are schools and the principals. They have budgetary sovereignty regarding educational material and therefore are primarily targeted. In this respect, the market is segmented into primary and secondary education. Both are of interest to Edu Island, which becomes clear when looking at the main users.

The app addresses students from 4th to 8th grade, i.e. students in the final year of primary education and in the beginning of secondary education, relating to the German school system. A BITKOM study shows that this is exactly the age when children first get a smartphone. Whereas only 25% of children aged 8 to 9 years have one, the number rises quickly to 57% (10 to 11 year olds) and 85% (12 to 13 year olds). As a consequence, this is a crucial age during which it is important to teach children how to wisely use smartphones and digital technologies. From this, arises Edu Island's significance as a tool to promote discipline towards deliberately staying away from phones.

A further group of users are the students' teachers. Their incentive to use the app is to trigger offline time during class in order to make students focus on the learning itself. Additionally, they want to enhance learning motivation outside the class and with Edu Island they can provide quizzes that are solved by the students in breaks or at home. Lastly, Edu Island provides teachers with the possibility of online classroom management through thing such as attendance checks, a news board, and homework announcements. In terms of regional focus - especially during the launch period - Edu Island focuses on the three German federal states with the highest number of school enrollments: North Rhine-Westphalia, Bavaria, and Baden-Wuerttemberg, in order to quickly reach a big user base.

Value Proposition

The value proposition that Edu Island offers to its paying customers, i.e. schools, is to provide a higher learning success for students. This goal is reached through two main components: better focus of students in class and educational quizzes for students - both achieved through usage of the Edu Island app and the web platform.

Basically, Edu Island connects a class on a virtual island, where every student has their personal avatar. In the beginning, the island is just a simple sandy island. However, the aim of the class is to develop the island as elaborately as possible, through the construction of components such as huts, breeding of animals and farming. The necessary items can be acquired through spending Kachings. These can be earned through two possible ways related to the two main components of Edu Island: 1) offline time in class, and 2) successfully answering quizzes within the app after school.

This is how, firstly, a higher level of concentration in class is reached: Students are motivated to stay away from their phones in order to earn Kachings. This results in a more intense in-class learning atmosphere and prevents students from being distracted by their phones. Also it teaches children responsible usage of digital devices by keeping them away from their phones deliberately in order to concentrate on other things.

Secondly, the educational quizzes within Edu Island also result in a deepening and further acquisition of knowledge amongst students. These quizzes, provided by Edu Island in cooperation with the educational publishing houses or created by the teachers themselves, are supposed to be done after school or during the breaks.

The gamified approach of Edu Island is further enhanced through inter-class competition: ideally, numerous classes in one school have the app and participate in the island development, i.e. the islands can be compared in terms of how elaborately they have been developed. This provides further motivation for students to stay away in class from their phones and to complete quizzes, which could also be part of their homework. Last but not least, the gamification approach aims to make students' learning experience more fun, which should in turn, lead to higher learning success.

Overall, Edu Island could not just support a standard classroom setting as we know it today, but could also be highly useful in the increasingly popular "flipped classroom" setting, because it would ensure students focuss on teachers in the morning and support them with new learning material in the afternoon.

Another aspect contributing positively to the value proposition of the higher learning success is online classroom management through Edu Island for teachers, such as attendance lists, a news board and homework announcements. These features enable teachers to focus more on the actual teaching and better cater to students' needs.

Customer Relationships

Edu Island's user groups consist of about 30 students and one or more teachers per island. To keep the company lean, Edu Island only stays in contact with one spokesperson at every school: the Edu Island Ambassador. This person gets personal help with setting up the islands in a workshop, and a chance to improve the product through feedback, which is collected from all the users in the school. Free learning materials and additional content from the publishing houses also incentivize ambassadors. In return, they help other teachers and kids with their problems and recruit new teachers as users. In general, they represent the platform in their schools.

For more general advice, there is also an online forum, where users can help each other or just exchange their opinions on certain Edu Island related topics. It is an easy tool, that does not need much effort from the company side but can be very effective if the teachers solve the problems in a collaborative manner. Moreover, enabling users to support each other does not only save money, but also deepens the personal relationship between the user and the product.

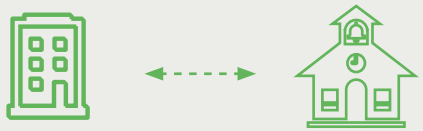
Channels

In educational institutions, innovation often takes place in a bottom-up approach. Teachers start a new thing, their colleagues adapt to it, and finally the school accepts the change. To approach schools with a new product like Edu Island, opinion leaders within the schools have to be convinced to introduce the game into their own curriculum. Therefore, a close personal connection to teachers is the core of our most important channel. Teachers who launch Edu Island at their school are part of an ambassador program, which provides benefits like free learning materials for them and their classes and motivates them to spread the word about Edu Island. This network of ambassadors is extended by a personal promotion campaign across schools, where the perks of using Edu Island in class are demonstrated. The focus lies on younger teachers who are open to innovation and possess enough technical knowledge to operate the system on their own.

A further channel is educational fairs like Didacta, which provide a good opportunity to present Edu Island to a larger audience. The exhibition stand shows a real-life use case where children can have fun playing with the island while teachers organize their classes within the app. Yet fairs are not the main focus of the marketing strategy, as the first adopters need to be convinced of the product. Therefore, the focus lies on the direct system of a sales force.

Another channel for raising awareness in schools results from the cooperation with the publishing houses. As they profit from Edu Island being licensed to schools through a revenue share, they also advertise the product accordingly (this point is also explained in the revenue streams and cost structure sections of our business model). Thus Edu Island gets a teaser page in every textbook, extending its reach into as many classrooms as possible. Publishers also hold a generally a positive reputation with schools, which inadvertently awards Edu Island crucial credibility and seriousness from the very beginning.

Publishing houses provide content for student quizzes and advertise Edu Island in their text books



Schools as paying customers motivate teachers in grades 4-8 to use Edu Island

Key Resources

Quizzes: Quizzes are one central educational element of Edu Island. While Edu Island offers a highly optimized and a usable quiz creation user interface, teachers may not have the time or motivation to create quizzes for all of their classes. This suggests offering another option to get ready quizzes for classes with one click.

On the one hand, teachers can take quizzes from a quiz-sharing platform where Edu Island teachers share their created quizzes within their schools and reuse or optimize them year after year. On the other hand, they receive quizzes created by the company with the content of the publishing houses, which are directly compatible with the textbooks they use (and may even contain the same questions in a digitized form). This leads to a customer lock-in because the content of the current learning materials and the quizzes are interconnected. As the number of digitized quizzes on offer increases, and teachers have more content created, this content becomes a key asset of Edu Island.

User Base: As soon as smartphone penetration among students reaches a relevant level, Edu Island can be available in schools. Having experienced the impact of Edu Island on their children, parents may prefer a secondary school that offers the platform. To have a competitive advantage and attract better students, secondary schools ideally are forced to offer Edu Island to their students and teachers.

As teacher trainees in Germany tend to switch schools, they may carry the word of Edu Island to other schools and incentivize them to utilize the platform. For them individually, the distress of losing their previously generated content may act as an appeal to promote it.

Teacher Ambassadors: Edu Island seeks to have an expert teacher for every school, who acts as a first contact person. Those ambassadors have a sound knowledge of the platform as they receive special training through Edu Island and are, as they do this on a rather voluntary basis, expected to show a high level of engagement. This makes them a comparatively cheap expert stakeholder and thus a key person in the user structure of Edu Island.

Key Activities

The development of the applications for platforms like iOS, Android, and Windows Phone together with a cross-platform web page has to be conducted before the product launch. Furthermore, both sales and marketing are straight forward and are elaborated in the channels section of this business model. As content is one of the key elements of Edu Island, and the capacities for creating content are very limited, partnering up with publishing houses who already sell their textbooks to schools is a key activity. While the syllabi of Bavaria, North Rhine-Westphalia, and Baden-Wuerttemberg and their respective textbook publishers are relevant for the launch of the platform, constantly acquiring new ones is an ongoing process as the product is scaled to different regions and markets.

In addition, finding voluntary teacher ambassadors for every school is essential since they spread initial word of mouth in schools. Furthermore, they are the first point of contact for the users of Edu Island in one school.

Key Partners

Publishing houses for educational textbooks are a key partner for Edu Island, as they provide the core content for quizzes. Using this content, Edu Island employees transfer it into multiple-choice questions with the help of a graphical user interface. For Edu Island, content is a key resource, which makes reliable publishing partners very valuable. Furthermore, schools may have more faith in Edu Island if it offers content from various well-known publishing companies they already know or buy from.

From the publishers' point of view, co-creation of content is interesting, as they receive the data teachers create in school subjects that are related to their published books. Additionally, schools that use both textbooks and Edu Island quizzes from one publisher are incentivized to stay with that because switching costs gradually increase with the number of quizzes related to a specific book rises.

Both parties can extract a positive marketing effect, as the two products, textbooks and Edu Island, work best when used together. In other words, Edu Island is a complementary product for publishing houses.

Revenue Streams

Individual prices to skim the whole willingness to pay of each school lead to a negative image of Edu Island. Therefore, the focus is on two revenue streams without price differentiation between the schools and the number of students in one class.

The first one is a one-time fee at the beginning to be charged for the implementation and introduction workshop. The second is the subscription fees. In order to achieve a higher flexibility for the company, these fees are paid by the schools on a pro-rata basis, i.e. the company receives recurring revenues every half year.

One goal of the company is to incentivize the schools to pay for as many classes they have in order to enhance the inter-class competition. That means they have to pay the subscription fees for each class that wants to use Edu Island, but to make it more attractive, the fees per class decrease incrementally for every extra class the school signs up.

The aim is to reach a large user base as quickly as possible in order to cover the fixed and sunk cost blocks which are explained and analyzed within the cost structure section. Consequently, it is important to launch the product at a low price to overcome purchase resistances and penetrate the market. Afterwards, the company uses the penetration price strategy, i.e. increasing the subscription fees, when the product have been established to a certain degree.

Cost Structure

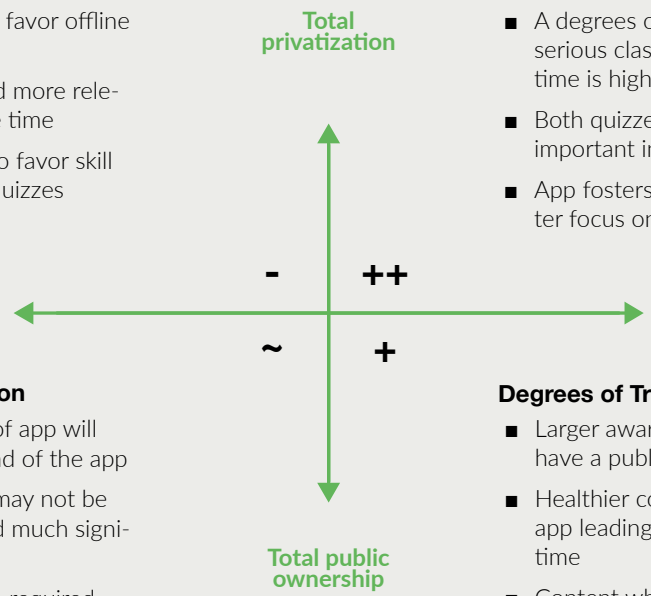
Since the company offers a web and a mobile application in order to support the learning process in school, the main cost driver is the development costs of the initial product. When the product has been launched, the costs for the further development such as updates and new features will play also an important role.

As a startup, Edu Island needs to promote the product as much as possible in order to reach a large user base. Consequently, another important cost driver is the marketing and promotion costs. Although the publishing houses carry a large share of this cost and function as one of the main marketing channels, there are remaining costs for activities such as establishing the sales force and visiting promotional fairs.

These cost blocks are part of the fixed costs the company has to cover. Although a high fixed cost block is an obstacle for young start-ups, one advantage is the high market entry barriers for potential competitors. As a consequence, the company is able to increase the subscription fees when it is established and firmly footed within the market.

Additionally, licensing of the content provided by the publishing houses represents another important but variable cost driver. In order to motivate them to promote Edu Island, they are paid per school the company can acquire. It is also possible to negotiate a decrease in the price per class because the more schools and classes the company can acquire, the more potential teachers and co-creators use the application. Publishing houses are also interested in the feedback function of quizzes, which are created by the teachers. They can see how teachers transfer their learning materials into quizzes, which is in turn helpful for the further development of their materials.

Scenario Fit



SkillED

- High digitalization will not favor offline time and hence the app
- The quiz function will hold more relevance compared to offline time
- App should be designed to favor skill shaping with the help of quizzes

Degree Inc.

- A degrees only scenario implies a more serious classroom setting, hence offline time is highly favored
- Both quizzes and offline time can be important in this scenario
- App fosters more responsibility and better focus on studies with offline time

Democratic Skills Education

- Government acceptance of app will mean larger use and spread of the app
- As a classroom structure may not be existent, app may not hold much significance
- Skill based quizzing will be required so content needs to be appropriately sourced

Degrees of Trust

- Larger awareness of app is required to have a public initiative in schools
- Healthier competition through gamified app leading to less stressful classroom time
- Content which is now public can be easily accessed - hence easier to add in app

Degree Inc.

Edu Island is targeting public and private schools with a class-like teaching structure and students at the age of nine to thirteen. The app is perfectly integrated in today's school education custom, enforcing positioning shifts synchronized to the market development. The competitive segment of Edu Island suggests both purchases in bigger badges and thus lots of public funding. Fostering offline time as a core value is, however, very robust in this scenario perspective, as technology absence is key in creating focused learning sessions.

The strongest targeted user group, young pupils, do not experience a shift in their education facilitation, as teaching social and (inter-) personal skills is a main focus of this phase. However, scalability has to take a hit, as higher classes offer more autonomy to students, rendering a centralized, gamified focus generation system obsolete.

When universities compete for students with ever better digital products, both digital literacy and responsibility have to be taught at an early age, as pupils' obligation of choosing the right path and working for it is gradually required at a younger stage. Subtly introducing offline time into curricula empowers students to responsibly organize learning at a later time in their lives.

Degrees of Trust

Irrespective of the significance of degrees, keeping attention levels in a classroom setting high is of importance. Due to the incorporation of gamification in the Edu Island app, students will be more engaged. While giving teachers the freedom to create their own quizzes, teachers are also able to gather content that is publicly available in this scenario. They easily have class testing systems through the app itself.

Thus, the purpose of the app is multi-fold: better attention spans amongst students, better testing systems, better content creation from publicly available content, and a healthy competition between students by means of edutainment.
For a public system, a wider acceptance of the app would be necessary. A public organization will only be willing to accept the app if more schools see the app as a necessity and not as an add-on. A challenge in this scenario would therefore be penetrating a publicly managed market, which would require a higher level of convincing schools and teachers of the significance of offline time and its importance in a scenario where degrees are important.

SkillED

In the scenario skillEd, the app Edu Island does not seem to be robust and fit into the probable future development at first glance. The reason for this lies in the widely spread digitalization of the education sector. Technological education concepts such as virtual reality classrooms or homeschooling represent a deep need for online time and use of mobile and smart devices. Therefore, an application as Edu Island that fosters offline time is likely to not be accepted and used in the future.

However from a different perspective, the second main function of the app, the quiz function, leads to high market potential in the skillEd scenario because it does not matter whether the requested content of the quizzes is about certain degree studies or about skills. Additionally, the development towards complete privatization of the education sector can lead to increased revenue streams due to a higher willingness to pay.
To sum up, the current business idea does not appear very robust except in fields where students need to focus on a certain task and mobile devices will distract them, for example, during the inspiration and creation time of a painter. In case of such a development, Edu Island should focus on the quiz and competition features.

Democratic Skills Education

Considering the fact within the scenario "Democratic skills education" learning is completely paid for and administered by a European-wide governmental body, Edu Island would find a promising market environment. The best possible penetration of the app in schools together with secure funding is guaranteed, when the government decides to use the app to support teaching.

However, the second relevant factor in this scenario, "degrees don't matter," leads to an extreme individualization of curricula and the transition from a class- into a course-setting. Students only have to meet with students in the same courses once a week in person, but can do so at any Education Lab in Europe. This means that traditional class structures no longer exists. An exception here is the five-year Basic Skills School that still requires mandatory presence in class. Here, Edu Island could be used during the last two years and serve the purpose of teaching disciplined learning with digital devices.

Furthermore, thanks to technological progress and in order to make education free for everyone, teaching takes place through digital devices at home after the Basic Skills School. These developments result in Edu Island losing some of its relevance regarding the advantage of keeping students away from their devices in class.

All in all, Edu Island's robustness regarding Scenario 1 can be described as moderate, as the classroom setting in a fixed location after the Basic Skills School, i.e. grade 5, is dissolved and the availability of high-tech home-school teaching devices. Edu Island would have to be transformed into a single player game after grade 5, as there is no longer a fixed class or course structure.

Outlook

The Edu Island app can be developed and launched within the coming months, parallel to acquiring of the first publishing house partners. This crucial activity is needed to provide the app to the schools and teachers with content.

Once Edu Island is established in a wider array of schools, the app can be scaled depending on scenario signposts being realized. Developing attractive applications for older students is an obvious approach. It shares the challenge of building a viable way of engaging this altered focus group with another target: improving focused offline time in certain office settings.

An area of mid-term development would be keeping Edu Island continuously engaging so that students do not get bored easily after a short time of use. As consequence, different levels other than just an island need to be developed in order to scale the product. Also, a more challenging game to compete with each other would make it more acceptable for students of older age groups and potentially universities and corporations.

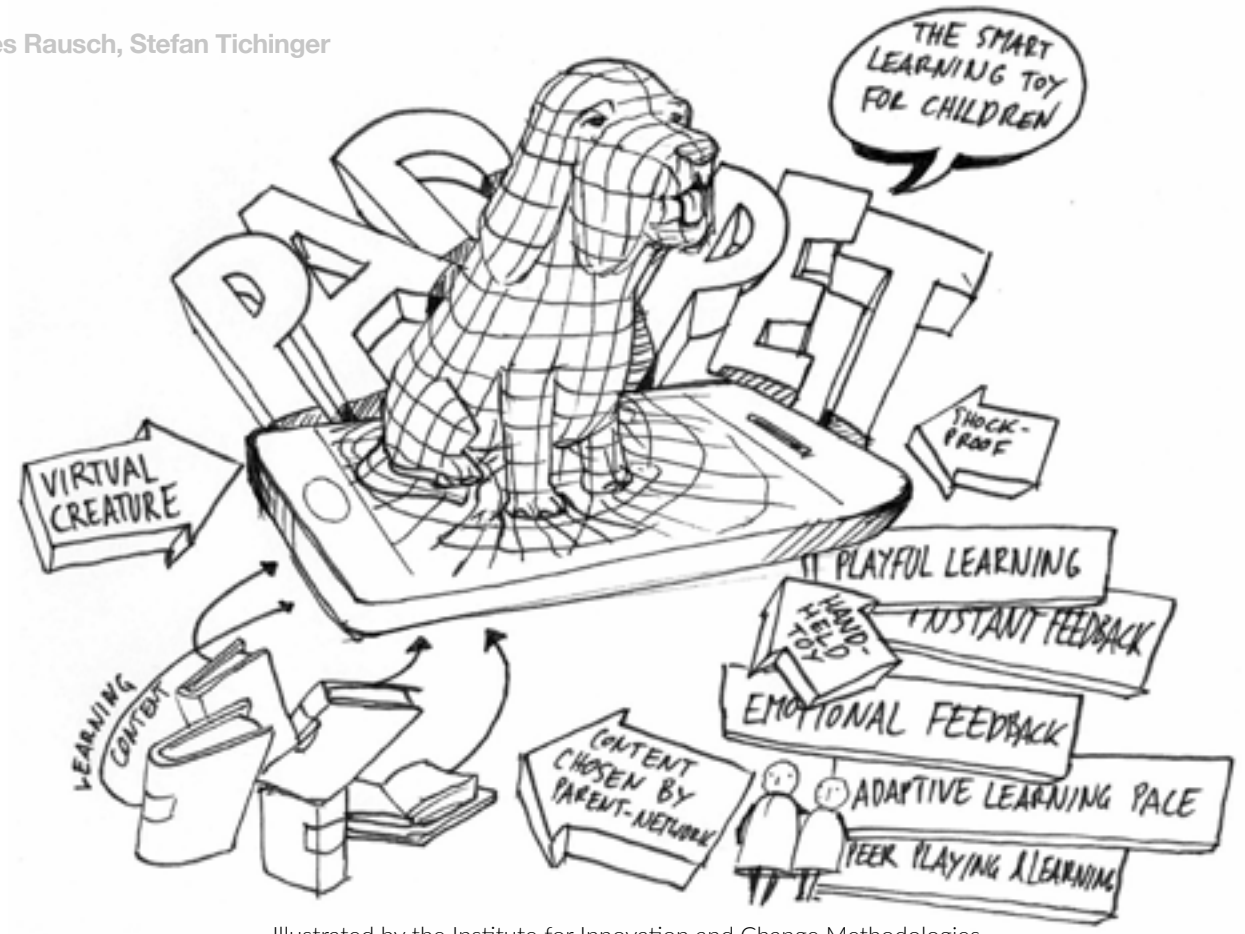
The long-term vision of the Edu Island will be to offer the playground for inter-school competitions in Germany.

Challenges

- Keeping the app playful to avoid boredom and disengagement amongst students
- Acquiring publishing houses as key partners and their content as key resource
- Adoption of app by schools and teachers and acceptance from federalized school systems
- Scalability to older age groups and possibly corporate settings

Benjamin Borrow, Benedikt Brandner, Annika Kreil, Johannes Rausch, Stefan Tichinger

Pad Pet



Illustrated by the Institute for Innovation and Change Methodologies

Portable, smart learning toy for pre- and primary school children with gaming elements

PadPet is a learning companion toy for children. The digital device - equipped with touchscreen, bluetooth and wifi connectivity, and voice recognition - serves as a surrogate teacher for young children aged between 3 and 8 years. Crucially, the 'teacher' here is a virtual PadPet companion that 'lives' in the device and depends upon the care of its owner to survive. However, in order to provide care for their respective companions, children must answer quizzes and engage in other learning behavior. These quizzes are based upon a course of content chosen by parents and created by learning and gaming experts at PadPet Incorporated. Children can also put their PadPets to battle against fellow owners that are nearby and connected over the network.

Aside from the device itself, an online network for parents complements PadPet. Here, parents can engage in forums, provide feedback and make suggestions about new courses. By paying a monthly subscription fee, parents will also have access to PadPet Premium with two distinct features: analytics of their child's learning progress, and the ability to create content for their own child's device.

The PadPet device and online services result in a number of value propositions for both children and parents alike. For young children, PadPet provides a novel, engaging and highly motivating method of learning - harnessing the popular notion of "learning through play." The competition and collaboration component also encourages social learning. For parents, PadPet enables close monitoring of children's progress and a high degree of control over the learning content.

A particular strength of the business model is its multiple prospects for revenue. Firstly, PadPet will generate revenue from unit sales of the hardware. Secondly, PadPet course content will be sold online to parents, thereby perpetuating a lock-in effect. Thirdly, the subscription fee for PadPet Premium will provide another (recurring) source of revenue. And fourthly, PadPad can sell licenses to third party manufacturers to produce "official" PadPet accessories (like cases) and merchandise.

The outlook for PadPet is positive, as it is a suitable toy for children of all four considered future scenarios. Nevertheless, PadPet would expect to encounter some challenges convincing parents of especially young children to use the device; and some data privacy concerns may arise from PadPet's analytics component.

Business Model

Key Partners

- Kindergartens and schools (for pilot programing/testing)
- Third party manufacturers of PadPet accessories

Key Activities

- Content creation by experts in the education and gaming sectors
- Managing network of external education and gamification experts
- Optimization of user (parent) experience through better learning analytics tools
- Development of human-computer-interaction features suited for children
- Supply chain management

Key Resources

- Learning content produced by experts
- Usage data of parents and children for tailoring learning content
- Licenses for PadPet accessory production
- Online Community/Network of parents

Value Proposition

For children

- Fun: Playful learning with quizzes and instant feedback
- Educational: Learning content adapts to individual learning needs
- Social: Interaction with other PadPets in competitions possible

For parents

- Optimized learning progress by learning analytics
- Choice and creation of individual learning content

Customer Relationships

- Bind parents to PadPet by supporting them in their role as educators with the PadPet
- Customer lock-in by making the features and content platform-dependent
- Free online community involves parents in companies decisions on new content
- PadPet Email newsletters and free trials incentivize usage of the products

Channels

Distribution

- Traditional retail stores
- Online retail stores
- PadPet online store

Communication

- PadPet parent platform
- Email newsletters

Customer Segments

- Parents: care about trendy, educational, traditional toys
- Relatives and friends: Buy the PadPet as a gift for children
- Kindergartens and primary schools: Use the toy for educational purposes

Cost Structure

Fixed upfront development costs

- For physical PadPet
- For courses
- For website with online library and community area
- For analytical tool and content creation software

Fixed operating costs

- For safety approval
- For patents and legal fees
- For marketing and advertising

Variable operating costs

- For outsourced production
- For transport and distribution

Revenue Streams

- Asset sale of PadPet device
- Content sale of different courses for individual fee
- Subscription fee for premium membership
- Licensing secured rights for accessoire production to third parties

Customer Segments

The main target group of the PadPet consists of children in pre- and primary school, aged between 3 and 8 years. Younger children are usually attracted to objects they can feel and touch. Popular and typical toys are building bricks, puppets, modeling clay and board games. [317] These preferences underline the desire of young children to be creative while playing. Both boys and girls especially accept educational toys if they are designed in a gender-neutral way. [318] Another major aspect of toys for children is interactivity. Feedback during playing sessions helps sustaining an engaging playing experience.

As children between the age of 3 to 8 years usually do not buy their own toys, the main customer segments for educational toys are people that buy children presents or care about their education. These people are first and foremost the children's parents. Relatives as well as nurturing institutions such as kindergartens and pre-schools are also important customers.

Parents and relatives: The main customer segment is the children's parents who want their children to be well and individually educated from early on. The PadPet and accompanying services target parents who place a high value on educating their children. However, parents are often limited in the time they can personally spend with their children due to other obligations. The PadPet connects them with their children and can remove time limiting factors to facilitate the parent-child relationship.

Another customer segment is formed by relatives, who are often not as involved in the playing habits and toy preferences of the children as parents. Therefore, they might more likely rely on recommendations of retailers or buy traditional toys.

The most important buying criteria that European customers consider for toys is their educational value. [319] For over one third of German customers, educational value is the most important criteria in the purchasing decision. This ratio is even higher in most of the other European nations. [319] The second biggest factor for German customers is the trendiness of toys, which could be influenced by the design of the product as well as targeted advertising. Most people are still rather traditional in their buying habits, and mainly use big stores and retailers as a source for new toys. [320] Facts show that the PadPet and its features fit current demands of the biggest customer group very well.

The trust German customers place on toys is especially dependent upon a quality of 'harmlessness.' [321] Toys should not have any features that might be dangerous for children, for example choking hazards, toxic materials or sharp edges. The majority of consumers also prefer toys that have a seal of approval. [321] The PadPet's safe shape and materials as well as the high quality standards of its learning content are therefore meeting a high consumer demand.

Educational Institutions: Kindergartens and pre-schools usually offer a broad range of toys to be played with. These institutions try to offer services and products that satisfy their respective customers, which are the children's parents. Educationally valuable toys are especially appreciated in the toy portfolio of these institutions.

As kindergartens' respective customer group, the children's parents, overlaps with the main PadPet's main customer group, the efforts to make the PadPet interesting for parents indirectly increases the PadPet's value for kindergartens and pre-schools. These institutions are thus encouraged to purchase PadPets for shared usage amongst children and open up new channels and revenue streams.

Value Proposition

PadPet's primary goal is to motivate pre- and primary school-aged children to learn continuously while having fun. The PadPet's hardware consists of a plastic case with a touchscreen and integrated Wi-Fi and bluetooth sensors and is shock resistant and waterproof. The software is comprised of a virtual companion that can be seen on the touchscreen. This virtual companion learns and plays with children and grows when children are caring for and learning with it. Parents can buy courses for the PadPet in an enclosed online store. As the PadPet adds value to both the children who play with the PadPet and their parents who choose the learning content, these two groups will be treated separately in the following.

Value Proposition for children: PadPet is educational. PadPet is an educational, portable toy that helps pre- and primary school-aged children start learning in a playful way. PadPet motivates children to learn continuously as the virtual companion's well-being and further development is dependent on the learning progress of its owner. Thus, learning becomes more appealing, interactive and enjoyable.

Suited to differing education levels, PadPet questions children about a diverse range of learning material and recognizes the owner's responses via the integrated voice-recognition system or the touch screen. Moreover, the learning content is adapted to the individual learning needs, skills and pace of the child. After having answered a question, PadPet gives instant, emotional feedback to the child on the correctness of answer. For example, the PadPet's emotion changes according to correct answers. A further option enables children to challenge the PadPet about previously taught learning content, for example by asking the PadPet questions via the voice recognition system. Learning material, which can be added to the PadPet via an online library, is segmented into different learning levels, including basic, medium, and advanced courses, and according to age. Parents can buy additional learning content for higher levels in the online store.

PadPet is fun: Another main value of the PadPet is that the virtual learning companion is integrated in a playful and enjoyable environment. The child must take care of his or her own PadPet companion. Through caring for the PadPet, the toy becomes more interesting for children as they can build a personal relationship with the toy. Caring activities include

playing with the PadPet (this can be done alone or with other connected PadPet friends), feeding it and cleaning its home, which may become dirty with the companion's waste. The actual virtual companion is offered in a few different forms, for example, a PadPet can be purchased in the form of a lion, dragon, pony or bear - with the range of available companions expected to grow after a successful market launch. Children can decide on the PadPet companion's form by choosing a particular color of the physical PadPet - for example, a red frame may denote a lion lives 'inside.' This means children decide to choose a particular PadPet and are therefore likely to become more invested in their PadPet's well-being. The design of a PadPet can be further customized by buying cases in individual colors or with different forms that complement the individual companions.

PadPet is social: The PadPet offers an engaging, social and fun experience. It is designed to be played with and without any social interaction. To compare the individual progress with peers, children can establish networks of PadPet friends connected via a Wi-Fi or Bluetooth connection. Within this network, children can play with their PadPet friends in a collaborative or competitive way.

In virtual competitions, children compete via Wi-Fi or Bluetooth with connected PadPets friends in different learning categories in the form of quizzes. Another value add of the PadPet is the opportunity to do "casual competitions." In this case, children meet friends physically and connect their PadPets via an integrated Bluetooth function. A first benefit of both the virtual and casual competitions is the fact that children are in a closed circle with known friends. The constant contact with friends' PadPets may foster the child's intrinsic motivation to train with PadPet on learning material and level up learning material to keep up with their friends. In these competitions, the individual PadPets' chances to succeed are bigger if children spend more time using the educational features.

Besides competing against others, children can also collaborate on learning content with their PadPet friends and create solutions together, for example through solving quizzes. Collaboration can occur virtually or physically, via Wi-Fi or Bluetooth connection.
Both the competitions and the collaboration amongst PadPets increase the "peer-pressure" of children to own their own PadPet and join PadPets meetings with friends.

Value Proposition for parents: Not only does the PadPet offer immense value for children, but it also offers great advantages for parents who want their children to be well educated from an early age.

With the purchase of a PadPet, parents can access the PadPet online platform with an integrated learning library. In this library, parents can customize their child's learning through purchasing learning content for their child's PadPet. The library adds a major value to the learning experience with PadPets and is a unique feature to acquire new learning content. Content in the library is created and designed by experts in game mechanics and with educational content production experience. More detailed, library-learning material is tailored specifically to the child's age, to a diverse range of learning subjects and to the usability of the PadPet. Parents can therefore be assured of the quality and safety of learning content when buying from the library.

An additional feature of the online platform is the "PadPet Parents Community," where parents can rate the offered learning material. This ensures a constant feedback to the offered courses. Moreover, in this community parents can suggest further learning courses.

The largest advantage for parents is presented in the form of the PadPet premium membership. With this membership, parents can optimize their child's learning experience through individualizing the learning content. Via a web-based learning analytics tool, the "Parent's Cockpit," parents can track the learning progress of their children according to data collected by the PadPet. Moreover, this analytics tool proposes next steps and gives recommendations to parents to optimize their child's learning progress. Parents can profit from the premium membership by paying a monthly subscription fee. A further value included in the premium membership is the opportunity for parents to create learning content for their own children. This makes the PadPet ultimately individual and facilitates parent's teaching and involvement in their children's education. Moreover, the PadPet provides parents attractive means to ensure and control progress in their learning development while children are given the feeling of independence in their learning. This renders the PadPet a powerful tool that makes the relationship between educating and being educated more effective and engaging.

Channels

In order to successfully deliver the value proposition to the market, communication as well as distribution channels must be seamlessly integrated.

Distribution Channels: The acquisition of the PadPet starts with the purchase of the toy at a point of sale. The hardware of the PadPet will be sold in traditional toy stores since the majority of toys are still sold there. [320] Moreover, the PadPet will also be available in online retail stores. Customers can buy the PadPet toy in indirect online sales stores such as Amazon. With this, an even broader audience can be reached. Additionally, it is possible to buy PadPet hardware directly on the PadPet online store. This can increase the margin by removing middle points from the sale chain.

Communication channels: To raise awareness for the PadPet, search engine optimization fosters the visibility of the PadPet online when searching for educational learning content.

After having purchased the hardware of the PadPet, customers gain access to the online PadPet community with the basic and premium membership respectively. Besides creating a strong customer relationship, the community will help spread awareness through word of mouth marketing. The premium membership allows parents to track their children's learning progress via learning analytics. Since engaged parents will visit it regularly, most of the existing interested customers can be reached effectively via this channel. The benefit of having direct control over the platform is that customer contact can be done in a decent and non-disruptive way such as insight popups, polls, etc.

Email newsletters can provide a bridge to customers who do not use the PadPet's online services regularly, by sending them updated about new courses and promotional offers on a bi-weekly basis.

Customer Relationships

Members can vote on offered courses and give honest feedback in the basic membership version. Moreover, parents can share their PadPet profiles, such that other members can easily adapt their PadPet's courses if they are convinced by other member's profiles. As parents and adults in general are the group of customers that is expected to purchase the PadPet and additional content, they are the main focus of our customer relationship efforts.

A key goal within the context of customer relationship management for PadPet is maximizing customers' perceived product experience. PadPet aims to facilitate the relationship between parents and their own children by giving them several tools that support parents in their role as education-facilitators. Binding parents to the PadPet through their children ensures further purchases of learning content or additional features.

Therefore, the service scope of PadPet goes beyond a one-time only purchase. A corresponding online platform as well as multiple other premium service options aim to ensure customers' optimal and individual utilization of PadPet's features.

With regard to direct sales activities, customers purchasing the PadPet are offered a free starting package including an in-depth product briefing, access to the online community and one month premium membership as well as a voucher for one individual learning content for the PadPet. Thus, customer data can be collected and potentially used for further marketing or relationship-building activities.

After the purchase of the PadPet, customer relationship activities focus on the creation and maintenance of a free PadPet community. There, parents can make suggestions and vote for new learning packages. According to the demand of the community, new content will then be professionally created and added to the PadPet online library. Moreover, parents can share their PadPet profiles, such that other members can easily adapt their PadPet's courses if they are convinced by other member's profiles. With these features, participating parents are given the feeling of being part of a community of involved parents.

This free parents' community differs from the PadPet premium membership, which mainly focuses on learning analytics and content creation. It has the main function of observing and steering the learning behavior of the children. Premium membership offers the tools necessary for parents to analyze the learning progress of children using PadPet. Moreover, it gives parents the opportunity to create learning content for their own children. The PadPet premium membership binds parents to the product, because it gives them better means to strengthen their role of educators in the parent-child relationship. This way, parents feel more involved in their children's education and can overcome limitations, for example due to their work schedule. Having this positive experience, parents are more likely to further rely on the PadPet in their children's education. A customer lock-in effect is expected, as these advanced features are only accessible through the PadPet premium membership.

Key Resources

Alongside the standard resources that belong to companies producing technical hardware (such as initial financial backing, warehouses and design patents), there are some key intellectual resources that are particularly significant to PadPet's business model.

Firstly, the PadPet company will own the learning content produced by the gaming and learning experts. This should ensure the content is of a high quality and cannot legally be reproduced by competitors or those looking to provide the same content on other hardware. Secondly, PadPet intends to sell licenses for the production of PadPet accessories, including cases. As a consequence, the trademark, or the "PadPet" brand will be another key resource that will provide ongoing revenue for the company. Thirdly, PadPet will retain user information and usage data. Therefore, PadPet will be obligated to keep the personal information of its customers safe. However, usage data will provide a useful source of inspiration for optimizing the user experience and learning traits. Fourthly, the company will own the parent network and online community of users. As such, PadPet would have access to information concerning how parents are engaging with the content, what they think of the product. This will also require servers and other technical resources to keep the site running.

Key Activities

The production of high quality content is one of PadPet's key activities. Hired experts will create content that is both educational and suited to PadPet's playful format. Content will mostly be produced for the launch of the device; however, since parents will be able to vote on content they would like to see featured, the freelance experts will also be hired to produce the most popular parent-requested content. These updates can also be based on analysis of user data. Indeed, with access to children's learning patterns and usage trends, course content can be optimized and updated in subsequent releases.

From a marketing perspective, personal data may also be used to enhance the user experience for parents. Indeed, newsletters and CRM tools can be employed such that PadPet's interactions with the parents are customized according to their children's PadPet usage. This key marketing activity will develop a desirable customer experience for parents.

Moreover, the supply chain management involved in producing and distributing the PadPet is another primary activity for the company. Indeed, although production and distribution would be outsourced, these steps need to be kept running smoothly and efficiently at PadPet's end. The product would be designed in Germany, where PadPet can have an active role in design tweaks and specifications. This design would then be manufactured in a labor-cheap country such as China or Malaysia, where PadPet would likely place an initial order (with subsequent larger orders to follow) for the production of the device. The parcels would then be shipped to Germany, to be stored in warehouses until it is distributed to partner retailers and directly to customers ordering the product online.

Key Partners

PadPet will enjoy partnerships with wholesalers, manufacturers, and online retailers. However, the company will also explore partnerships with two other distinct and significant parties.

Firstly, for development-phase testing, PadPet will partner with a select group of kindergartens and primary schools to study user experience and determine necessary changes for

the product. This partnership yields a couple of benefits. It will ensure the product is tweaked and user-tested before it officially hits the market, and it will also have a peripheral marketing effect whereby word-of-mouth is likely to spread amongst suitable customers (such as parents of young children). Moreover, once PadPet is ready for release, pilot programs can be run in partner kindergartens and schools as a further marketing ploy.

Secondly, PadPet will develop partnerships with third-party manufacturers of PadPet accessories and merchandise. These external manufacturers will have to buy licenses from the company to produce "official" accessories and merchandise – including, but not limited to: cases, bags, stickers, and soft-toys. This arrangement has a handful of benefits. It will ensure PadPet does not incur expensive overhead production costs, while at the same time provide a steady form of income (through purchases of the license). Here, PadPet can also explore German manufacturers, which carry a sound reputation for quality. Moreover, German parents are rather parochial in their purchasing habits - 64% note a primary motivation for toy purchase is the country of origin - [321] so PadPet could develop an association with German production despite not being produced in Germany itself.

Revenue Streams

Revenues are generated from four different streams: from the asset sales of the PadPet, from the purchase of courses for the PadPet, through subscription fees for PadPet premium membership and from issuing licenses to third parties for producing merchandise products for the PadPet.

Asset sale: To achieve a high market share as quickly as possible without making a loss, a cost-based pricing strategy is pursued for the physical PadPet device. With this pricing strategy and with a very low profit markup on the cost of the product, PadPet sells the hardware for a relatively moderate price in order to lure customers into the purchase. This strategy will likely generate revenue with little profit for the initial one-time purchase for the PadPet. It promotes, however, follow-up purchases of high-margin PadPet courses and the additional services for the PadPet. This approach is similar to the approach taken by printer producers who primarily make profit of the sale of cartridges rather than the printer hardware. Thus, PadPet asset sales are characterized by a lock-in between the initial physical PadPet and the follow-up courses and services.

Content sale: A secondary revenue stream comes from the sale of PadPet courses. The first course is included in the price of the physical PadPet. Customers can purchase additional courses for their children in exchange for a certain fee from the online library on the webpage. From which point, they can choose courses with different topics and with different degrees of difficulties. For these add-on purchases to the physical PadPet, the lock-in effect will come to fruition. Thus, the courses will be offered according to a value-based pricing strategy. This means that all the courses are within the same price range but might have different prices. This is done under the assumption that parents are willing to pay more if their children want to learn extraordinary courses- for example, the 'Basics of Mandarin' will be more expensive than the 'Basic Math' module.

Subscription fee for premium membership: Access to an online community where customers can vote and make suggestions for new content comes with the physical PadPet. This online community is free of charge.
Selling access to a premium membership, however, generates a third revenue stream. Furthermore, it allows customers to use a web-based software to create their own content for the children's PadPets. After 30 days of free trial, customers can sign up for the premium membership and then access these services in exchange for a monthly subscription fee.

Licensing: Finally, a fourth revenue stream comes from licensing secured rights to third parties to manufacture and commercialize accessories for the PadPet. In exchange for license fees, the third parties receive the right to produce accessories for the PadPet brand and are allowed to commercialize these products on the market. To ensure the quality of the accessories, the third parties are chosen on an individual basis after a comprehensive quality check. This approach is chosen in order to participate on the market for accessories, but still mainly focus on the PadPet device, the content creation and additional software services, which represent the core competencies of PadPet.

Cost Structure

This section describes the structure of the costs. For the development of the physical PadPet and its affiliated courses and services, PadPet is faced with initial development costs. Besides these classical fixed costs, there are operational costs, which include fixed as well as variable costs.

Development costs: The development of the physical PadPet, the courses, the website including the parents community area as well as the analytical tool and web-based content creation software requires large development investments, which are sunk costs.

Development of physical PadPet: The initial development of the physical PadPet is performed in a development center. Thereby, costs for the use of the development center including costs for professionals such as engineers, designers and software developers staffed on the project, costs for hardware and for the development of prototypes will arise.

Development of courses: For the development of the first courses, specialists with educational know-how and gaming experience as well as software developers and designers are hired on a freelance basis. They are hired as freelancers because content creation will likely be required sporadically and not on a full time basis.

Development of website with online library and community area: Another main cost is the development of the website, as well as the online library. This can be done by developers employed at PadPet, or if software challenges exceeds their expertise, by a software development agency. Another cost position related to IT is the infrastructure with servers and the development of the backend.

Development of analytical tool and web-based software to create content: The highest costs are personnel expenditures for specialists with educational know-how and software developers as well as designers on a freelance basis. This shows that the development of the PadPet requires a significant amount of resources, time and therefore a high budget. Due to high development costs, and no revenue at this point in time, a significant amount of money from an investor or another source is needed to pre-finance the development costs.

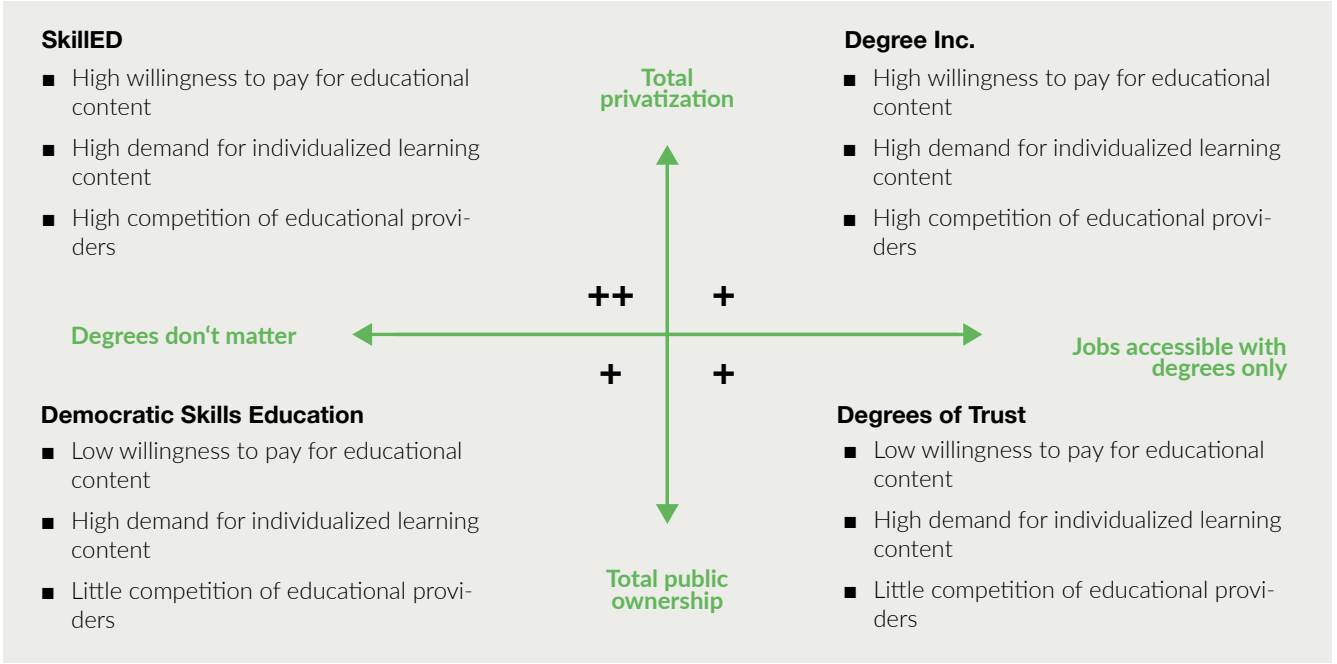
Fixed operating costs: After the initial development of the products, other fixed costs will arise. As the PadPet is intended for children from the age of 3 to 8 years and since parents attach great importance to safety, costs are involved in the toy's safety approval by the TÜV as well as by the GS certification. [322] In addition, PadPet aims to protect the brand and the design of the PadPet with patents to secure it from unauthorized usage.

Beside the fees for the patents, there will also be legal fees to secure these rights. Furthermore, there will be other fixed costs for renting an office for PadPet as well as a warehouse to store the physical PadPet.

Additional fixed costs will result, if freelancers will be hired on a long-term basis to produce new courses, update the old ones, or maintain the IT infrastructure. Another major investment will be for marketing and advertisement of the PadPet. In particular, the PadPet brand has to be formed and promoted to attract and lock-in customers.

Variable operating costs: Variable costs vary with the change in the production volume and are dependent on the number of produced items of the PadPet devices, courses or subscriptions to the premium membership. [323] The production of the physical PadPet is outsourced to a production facility in order to make use of the economies of scale of outsourcing providers and in order to lower the risk of the production. This will result in costs per produced item for PadPet and transportation costs to Germany. As the distribution is mainly via retail shops, there will be additional variable transport costs to the wholesalers or retail shops. For the courses and the services, no significant variable costs occurr because they are digital products and are therefore easy to scale. [324]

Scenario Fit



Degree Inc.

PadPet would also thrive in a world such as that described in "Degree Inc.", where only private education institutions exist and students need to ascertain recognized degrees in order to enter the workforce.

PadPet would be successful in a scenario of exclusively private institutions for a number of reasons. Firstly, private institutions normally have substantial financial backing and can afford to invest in high-tech, modern equipment for pupils. As a consequence, PadPet may be widely used in such classrooms. The equipment would ideally become a "must-have" for private institutions competing for student enrolments. Secondly, since public educational resources and information will be limited in a world full of private institutions, there will be a willingness amongst schools and parents alike to pay for the individual courses available for the PadPet. Thirdly, the privatization of education is expected to increase individual competitiveness amongst pupils (and their parents). Therefore, parents will likely seek out and continually pay for technology that helps their children learn. PadPet's customizability is suited to such an eventuality.

Depending on the use of PadPet in private schools or at home, it might be necessary to offer certain PadPet courses that offer some sort of a micro degree to incentivize the use of PadPet in private homes more than just the game and learn concept by offering certification.

Moreover, the educational analytics of the PadPet could be used to fast-track children in schools to determine appropriate streams to pursue later in life (with the ultimate goal of attaining the most suitable degree). Similarly, the analytics and results concerning PadPet users could become "pre-degrees" or "degrees for kids" in order to determine a whether a child is satisfactorily 'qualified' to enter the next year of school or begin the next section of his curriculum.

Degrees of Trust

In the scenario "Degrees of trust", all educational institutions are public and future employers only care about the degree of a potential employee. Furthermore, this scenario is characterized by a standardized and free educational system.

The PadPet business strategy could be adapted to work well in this scenario. This is supported by the fact that in a world where only degrees matter, parents will have the incentive to prepare their children from early on. Pre-school-aged children could use the PadPet to prepare for school in order to get better grades in the final degree.

Since there is a standardized curriculum imposed by a centralized institution in this scenario, the PadPet could be used in all primary schools to repeat the class material. However, this also depends upon whether the centralized institution is willing to co-operate with a private company like PadPet. This of course, is not guaranteed. Assuming the content could be revised with the PadPet, increased competition among students, such as in this scenario, would be beneficial for the business model. This is especially true since parents or rather pupils in primary school would have an incentive to buy a PadPet to distinguish themselves from the other pupils.
A major threat in this scenario for the PadPet business model is, however, that the education is generally offered for free. This could adversely affect parents' willingness to pay for the PadPet and related courses, if the educational sector offers similar things for free.

Democratic Skills Education

In the future of the scenario "Democratic Skills Education", educational institutes are public and provide free, individual education with a focus on skills, not degrees. In this scenario, PadPet has good chances to flourish.

As the Basic Skills School - former primary school - has a predetermined curriculum every child has to go through, the PadPet is appropriate for parents to individualize their child's curriculum. One of the main values of the PadPet is the high quality of its educational content, which is designed and created by learning experts. A co-operation with the centralized institution might ensure that this learning content can be included in the European Skills Database.

With the learning analytics of the PadPet, children could be fast-tracked to determine appropriate steps on how to proceed in their learning development. This helps parents to determine from an early stage whether their children attain particular skills. Then, the analytics and results provided about PadPet users could become "pre-skills" or "skills for kids".

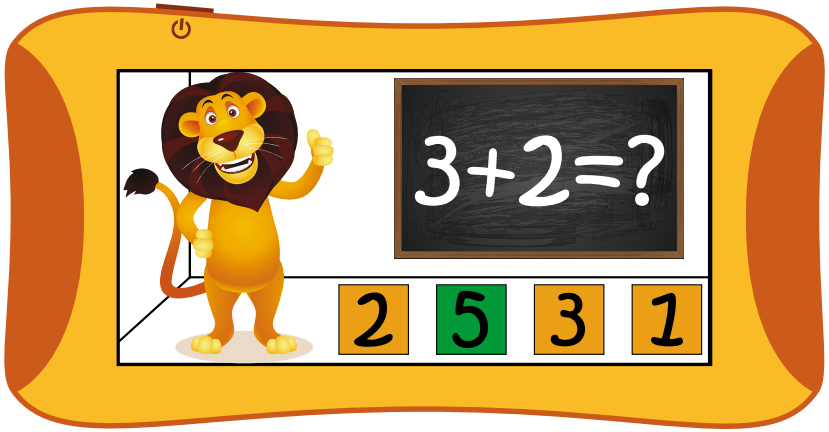
However, as all education is for free, parents might not be willing to pay for this extra education of their children, especially if the public education sector offers similar courses and learning content as the PadPet.

SkillED

In a world where employers and society do not place any value on university degrees, skills and knowledge in various fields are an extremely important resource in life. Employers might rely on external assessment providers that test people's individual skills and rank them accordingly. In a privatized education sector, various providers have the possibility to enter the education market and the unique selling point of companies is the quality and effectiveness of their educational products.

In such a society, the importance of education from various providers rises tremendously, because the acquisition of qualifications ensuring employability is not limited to universities. One of the main characteristics of the PadPet is the high quality of its educational content with learning packages designed and created by professionals ensure a high learning rate.
A way of adapting to this skill-based society is giving out certificates for learning achievements that children make while playing with the PadPet. With learning analytics, acquired skills could be automatically added to a database. Competitions and tournaments will become more important for parents and children as a way to differentiate them from others and ensure better chances on the job market. Consumer's willingness to pay would be very high in this scenario, due to the high degree of privatization.

Thus, the PadPet fits very nicely in a scenario of a privatized education sector in a society that places little importance on university degrees.



Challenges

- Parental acceptance of technical device for very young children
- Creating a brand to attract and lock-in customers
- Getting listed in retail shops
- Privacy concerns with respect to learning data analytics
- Technical limitations (e.g. speech recognition, battery life)
- Building up a vivid online community
- Realize scaling effects

Outlook

n the future, physical group participation features could be integrated pursuant to an increase in the number of PadPet users. Larger competitions such as the “World Championship of PadPets” could attract new users and increase public awareness. These physical competitions could be events in a city where parents sign up for the competition online and indicate the learning level of their child’s PadPet. By doing so, PadPets with similar learning levels could be aligned in groups for the competition. Parents could attend the championship and supervise their children. Besides the intrinsic motivation to train for the competition, championships could also award the best PadPets and add the qualification to the PadPet profile online.

Improved voice and language recognition could be utilized to let children teach their own PadPets completely new information. This new information would grant PadPets a better development and performance in competitions. However, a challenge would be to ensure the correctness of the taught content. This challenge might be overcome by a smart algorithm which automatically verifies the taught content with a huge online learning database.

With a growing user base, more user data will be generated that enable new approaches of data analysis. Besides learning progress of children, new insights on user behavior, such as time spent on different questions, phrasing of verbal answers and usage behavior could lead to more precise matching of educational content to children’s needs. Moreover, these insights could be used to improve the content quality and learning analytics features for parents. A precondition for these advanced features is a highly penetrated market, though.
When children grow up with their PadPet, they might want to continue learning with “their” companion in later stages of education, too. In this case, there might emerge a huge market for the PadPet when developing learning content that is also suited to higher education.

David Adrian, Bastian Burger, Alexander Holzner, Isabel Poppek, Ahmed Shafei

VILA

VILA offers individuals the chance to learn a language through immersive 3D language training

VILA is a Virtual Reality (VR) software application for learning new languages. Based on the VR concept, the user gets engaged in a real life interactive environment while learning new linguistic skills.

This environmental involvement, which distinguishes the application from other language learning platforms, presents the business model's major value proposition. Accordingly, VILA introduces a new language teaching approach by letting the users directly apply what they have learned in a virtual real life. It allows the users to understand the language's culture in a better way, by virtually interacting with visionary native characters based on natural language processing. Moreover, it boosts edutainment to a new level of excitement with the help of VR.

Students, professionals and private consumers can utilize the application in different ways based on the various included language packs and scenarios. Since VILA requires specialized hardware kits accompanied by professional linguistic support, vital key partners include device manufacturers such as Oculus and language institutes. A major challenge lies in the feasible development and cost of the natural language processing framework. Additionally, to overcome the current small market size of VR E-learning, the business model utilizes multiple marketing techniques that result in an additional overhead.

Illustrated by the Institute for Innovation and Change Methodologies

Business Model

Key Partners

- Oculus VR (Favored hardware partner)
- Additional provider of virtual glasses
- Officially recognized language institutes

Key Activities

- Development of natural language processing algorithms
- Creation of virtual scenarios (e.g. 3D, scripting, soundscapes)
- Scientific foundation of the new teaching approach and its preparation
- Distribution, sales and marketing activities

Key Resources

- Digital assets (3D models, audio recordings)
- Development of natural language processing algorithms
- Language processing experts
- Linguists

Value Proposition

- Learning a language in its respective environment
- New teaching approach
- Edutainment
- Sensibility for cultural understanding

Customer Relationships

- In-App support (Pop-Up chat)
- Website & FAQ
- Customer hotline
- Oculus VR for technical support

Channels

Distribution

- Rift store
- Other VR stores
- Website

Promotion

- Targeted advertisement (Search Engine Advertising, Social Media)
- Affiliate (Classic, Tech blogs)
- Trade fairs
- Bundling

Customer Segments

- Private consumer market (B2C)
- International Companies (B2B)
- Students (B2C)

Cost Structure

- Initial costs (Sunk costs) – Development of natural language processing algorithms
- Recurring costs – Development and extension of sceneries
- Recurring costs – License fee for game engine
- Recurring costs – Further development of natural language processing algorithms
- Marketing costs
- Provision fee to App stores

Revenue Streams

- Freemium
- In-App advertising and purchases
- Distribution of App on own website via direct download
- Distribution of App through App stores
- Commission fee from language institutes
- Percentage of retail price for each purchase of a Oculus VR glasses

Customer Segments

VILA addresses the private consumer market on a Business-to-Consumer relationship level. Add-on products will be developed in order to satisfy customer needs of specific customer groups – those will be discussed at the end of the paragraph.

For the private consumer market, all language levels will be provided. According to the Common European Framework of Reference for Languages (CEFR), European languages range from level A to level C. [307] The target group of the private consumer market would be individuals who would like to learn the elementary linguistic usage of a foreign language that implies level A1 and A2 in the CEFR. This elementary linguistic usage of a foreign language is mainly acquired for short-term visits in a foreign country.

According to the UN World Tourism Organization (UNWTO), more than one billion individuals embarked on a touristic journey abroad in 2013. [308] Since 1950, the number of foreign tourists has seen a forty-fold increase, showing the size of the potential market, and by the year 2030, the number of foreign tourists will increase globally to 1.8 billion. [309] In summary, those travelers would gain a clear advantage by acquiring the linguistic basics of a foreign language and its respective cultural habits through a virtual and entertaining tool. Moreover, VILA will be able to address customers of different age groups. Considering the number of elderly people who quickly adapted to iPads and other digital devices, VILA will not struggle offering its new approach to older generations.

Specific features will be developed for professionals and students. These customer groups are more interested in acquiring a competent linguistic usage of a foreign language up to levels C1 and C2 in the CEFR. Moreover, professionals have an interest in acquiring specific linguistic skills in a foreign language for business objectives, whereas students will have an increased interest in acquiring a specific understanding and preparation for certain language tests. Specialized language packages will be provided to satisfy their specific needs.

One possible customer of such an add-on product could be a business man who travels several times to China and who would like to learn the linguistic basics of Chinese as well as their cultural habits in order to get prepared for future negotiations. Thus, he could buy specific features of VILA that he could regularly apply on his flights to China.

Value Proposition

VILA is a virtual reality application intended to offer an interactive environment for language learning. Typical locations for every language, for example a virtual restaurant or virtual bus station, are created in a virtual world. The user can walk through this world and interact with specific elements and animated agents (commonly referred to as non-player characters - NPC). Just like walking through the streets of Rome and, in order to improve their gastronomic vocabulary, the user can enter a nearby Pizzeria, where he can talk to the waiter, get wine recommendations, and order lunch. The conversation will take into account the unique sentences formed by the users, his overall skill level, and contextual factors such as cultural gestures or tone of voice.

In contrast to most of the common language learning platforms, VILA would not only serve auditory learners or visual learners, but also provide the best learning experience for the third learning style, the kinesthetic learner. This is done through the recreation of real looking environment and triggering the natural learning instincts of the user as if he or she were present in person. Another advantage of this new teaching approach is that culture specific habits can also be recreated and experienced by the user, without even leaving the living room or the office. All in all, the unique value is experiencing a virtual reality that is very close to what will happen in the foreign country itself.

VILA can be used without virtual reality glasses, but to enjoy the full language learning experience, usage of Oculus Rift glasses is recommended. The extended natural language processing algorithm is adapted to recognize incorrect sentences to improve the language learning experience. Also, further sensors like motion sensors for gestures or full surround audio can expand the user's journey into a fully immersive experience.

Channels

In April 2015, the WeArVR VR applications store announced that it has surpassed 150,000 downloads in January 2015. [310] [311] Also, the Oculus platform with more than 300 games was recently launched. [312] This implies that online stores are already playing an important role in VR applications distribution. Therefore, this business model aims to utilize those existing VR applications stores – including the Oculus platform – to publish the developed VILA application. This approach will help VILA establish its reputation on a wide customer base. Besides distribution via the existing VR application stores, the VILA application can be also purchased and downloaded from the official application website. Since the VR market is not yet that popular, this business model relies on multiple ways to successfully promote VILA to the targeted customer segments.

Targeted Advertising: Based on the fact that two out of the three customer segments are a Business to Consumer (B2C) relationship, targeted advertising fits really well. The first targeting technique is the behavioral targeting, where promotions will reach customers who visit language learning/institute websites or extensively read about other country's news and information. One example is Search Engine Advertising (SEA), where VILA will be advertised to those customers who search for related keywords or terms like, for example, "How to learn French". SEA will also be used to promote the application to customers who search for flights or hotel reservations in a foreign country (e.g. "Book a flight to Paris"). The second targeting technique concerns demographics targeting, which adds the demographical classification to the business model. For example, promotions can be targeted to school students who are always willing to participate in exchange programs. Expected to grow up to $14bn in 2018, Social Media (SM) advertising can be used as a tool to reach specific customer groups based on their demographical classification. [313]

Affiliate Marketing: Since the customer base is rather a closed community to those who are using the Oculus Rift or interested in buying it, affiliate marketing can be efficiently used to promote the application. VILA can include a referral system, where users can gain access to a specific language pack or scenario for free in return for advertising VILA to 3 other customers. Also, popular users can utilize their own blogs, Facebook or Twitter accounts to promote VILA and write their own opinions about it for some financial incentives. On the

other hand, traditional affiliate marketing can be used such as promoting the application over VR tech blogs or search engines based on the pay per click marketing technique.

Trade Fairs: According to figures from the international trade fair association UFI, there are over 1,100 trade fair venues with 250 million visitors worldwide – of which, Germany makes up 10% of the global trade fair market. [314] Usually, trade fairs grasp the attention of millions of users who are interested in a certain technology or field of innovation. This business model aims to promote the application by participating in trade fairs such as the Augmented World Expo and famous keynotes speeches such as speeches of Oculus. [315]

Product and Service bundling: A strategy that is frequently used to promote new applications is selling the product alongside other services in a bundle. This business model aims to utilize the established relationships with the key partners to bundle the application with their products or services. Firstly, the application will be distributed freely with other products such as the Oculus Rift goggles. Additionally, the application will be promoted by cooperating with the language institute partners. For example, upon signing up for a language course, the student will be given the free version of the application and also a free scenario of one of the packages.

Customer Relationships

A major issue that most of the business models face is how to maintain a strong relationship with their existing customers. Therefore, VILA will rely on four major techniques.

In-App support: Does the user face a problem while using the application? VILA provides in-app support where the user can chat instantly with one of the technical support agents. This shows the user that his problem is of a high importance to the company and ensures a high level of trust between him and the company. Moreover, specific problem statistics and live information (e.g. screenshots) can be immediately extracted to identify the cause of the problem and help finding the solution as quickly as possible. Finally, this kind of support is also very beneficial for in-app purchases, in case the user faces any problems while buying a new package or scenario.

Website and FAQ: As mentioned previously, the website is used as an official mean for distributing the application. Another benefit of having the website is that it can be used for receiving customer feedback and opinions concerning how to improve the application. Moreover, a FAQ section will be added that includes answers to the most common questions (e.g. How to use the application, how to purchase a new language package).

Customer Hotline: A dedicated phone hotline will be used to receive user critical issues and problems such as payment errors (e.g. User purchased a package but it's still locked).

Technical Support: In case the user has any problem with the device itself such as the Oculus Rift goggles themselves, he can either approach VILA and they will relay his problem to their partners – Oculus in this case – and then they can contact him, or he can directly contact the device's manufacturer to help him solve the problem.

Key Resources

The specialized natural language processing (NLP) framework and unique speech recognition (SR) algorithms developed for VILA are at the frontier of research. They are developed in-house and are not made available for public usage. Consequently, the technology will be the fundamental key asset in order to achieve the value proposition and to separate VILA from direct competitors.

Due to the complexity of cutting-edge research involved in the development and extension of algorithms, natural language processing experts become a key resource, as they are not easily replaceable. Similarly, the linguists developing the unique teaching approach, as well as supporting the NLP/SR research, pose an integral part with respect to the core activities.

The digital assets, in particular 3D models or soundscapes, have to be created specifically for each scenario, which entails high initial production costs. However, many assets can be reused across different languages and scenarios, and thus are a very valuable asset to decrease the longterm production costs.

Key Partners

The medium of presentation is not yet available to the mass market at the time of the publishing of this report. Consequently, there are partners required in order to master the technology, the distribution, and the languages. There are diverse opportunities of cooperation, especially with the VR equipment manufacturer Oculus VR. Especially in the beginning, the product will be dependent upon the virtual reality glasses by this company due to lack of alternatives. So the enterprise serves as the OEM for the software but can also be used as a partner in sales. For example in the case of a system seller (software strong enough to sell the hardware), Oculus will be incentivized to team up with the startup and to create synergies in marketing for the promotion of a bundle of hard- and software. It is also highly desirable to gain any insights in the development of the goggle and to get notifications of any upcoming changes to the ecosystem.

In order not to be too exposed to the exaggerated influence of Oculus it should be part of practical considerations to also keep an eye on their competitors as well. These might be Sony, Microsoft or the game publisher Valve. Although none of the above have yet to release a product as advanced as the Oculus Rift, they own powerful platforms that must be seen as attractive potential markets for the product. Under the assumption of a standardized bus for virtual reality devices the switching costs from a platform to another is not too high. Therefore, it is advisable to create prototypes for the other platforms assuming the product suffices the quality standards of the software.

Another potential partner should support with the demanding task of language skill assessment. This could be a language school or another product in the sector of language learning. Since it is argued that language processing and the user experience design are between the major and most money consuming tasks, it would be desirable to outsource or co-create those elements. The partner might be interested in the access to new technologies as well as the opportunity to target the software's users as potential clients for further, more formal, language education.

Key Activities

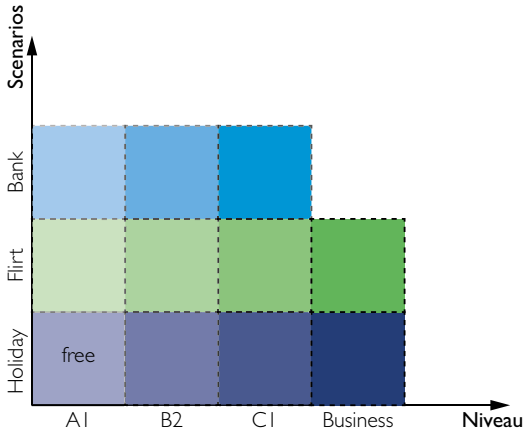
In order to achieve the goals of the value proposition, three major activities are conducted:

1) The design of a specialized teaching approach and curriculum that utilizes virtual reality scenarios to convey important topics and cultural aspects (history, gestures, etc.). Instead of traditional coursework focusing only on teaching grammar and vocabulary, VILA enables the student to gradually build up a structured understanding of the language by recreating the experience of living in the respective country. The student is engaged in highly immersive and interactive virtual reality scenarios that relate to every-day situations.

2) In order to achieve a realistic feeling and thus maximize the immersion offered by the virtual 3D scenarios, the creation of complex virtual assets will be an on-going effort. This includes the development of realistic high-poly 3D models (e.g., characters, environments, etc.), soundscapes, and realistic character animations that reflect actual gesture use in the respective culture as close as possible.

3) To technically cope with the imprecise language (e.g., mispronunciations, grammatical errors, etc.) of students learning a new language, a specialized framework for natural language processing is required. This supports the student by recognizing these mistakes and offering corrections through the dynamically generated answers of the conversation partners (similar to a helpful answer of native speaker, after hearing an incorrect sentence). The biggest effort outside of the development of content and technology will go towards the marketing and distribution of VILA, c.f., Channels and establishing a partner network, c.f., Key Partners, with, for example, VR gear producers.

Revenue Streams



VILA will generate revenues through three monetization models – Freemium, In-App Purchases and In-App Advertising. These monetization models will allow room for creativity and the opportunity of improving the app experience.

Freemium: VILA will be downloadable for free and customers will be able to experience the first scenario of a language of their choice for free. Thus, the application will be likely to get more installs. However, after finishing the first scenario, customers will have to buy subsequent scenarios.

In-App Purchases: After finishing the first scenario, the customers will have the opportunity to choose between different language packages. One language package will provide a certain number of scenarios. Customers will have the possibility either to buy one language package for one language level one after the other or to buy all required language packages for one language level. Moreover, customers will have the opportunity to buy the 'whole language package' that includes all language packages for each language level. The whole language package would imply the whole package range from A1 to C2 for a European language. In comparison, In-App Purchases will be the most significant monetization model for the revenue stream.

In-App Advertising: Due to the virtual reality in which the customer will experience his or her language teaching, VILA will install common advertising approaches such as posters and banners on its original place (home area) in the virtual scenario. Therefore, customers will notice the advertisements as a usual day-to-day experience. Depending on the customer size, the importance of In-App Advertising for the revenue stream will differ.

VILA will be offered in the Rift store, other VR stores and their official website. Thus, customers will download VILA for free from those platforms and purchase certain scenarios in case they want to continue after having experienced the first scenario. Due to the fact the Rift store and other VR stores offer a platform to sell the product, VILA will have to pay a commission to the respective app store. Therefore, VILA will generate revenue through its own website plus a reduced revenue gathered from respective app stores.

Moreover, on VILA's website there will be the possibility either to directly download the app or to buy a package that includes the app and Oculus VR glasses. Thus, VILA will provide a market place for Oculus VR glasses and gain a certain commission fee from Oculus VR for sold Oculus VR glasses.

Cost Structure

Research and development of advanced natural language processing algorithms consume lots of time, money, and labor before being fully introduced and applied. This initial amount of money has already been incurred and cannot be recovered. A high investment upfront will be necessary. On the other hand, sophisticated algorithms can provide an advantage for market positioning. These can have such a complicated nature that competitors and potential new entrants will not be able to easily copy or compete with VILA. Therefore, highly sophisticated algorithms ensure a leading market position and provide barriers for potential new competitors.

Recent developments in the game industry made it simpler for new developers to create new products. The game engine acts as the backbone for all interactive software such as games. Due to the nature of the product, the cost structure might be similar to those of huge software projects and computer games in particular. Some major players in the industry changed their revenue model from high one-time payment to royalty fees of, for example, 5% (Epic Games® Unreal™ Engine as of April

2015). This leads to reduced costs during development while increasing the costs throughout the sales.

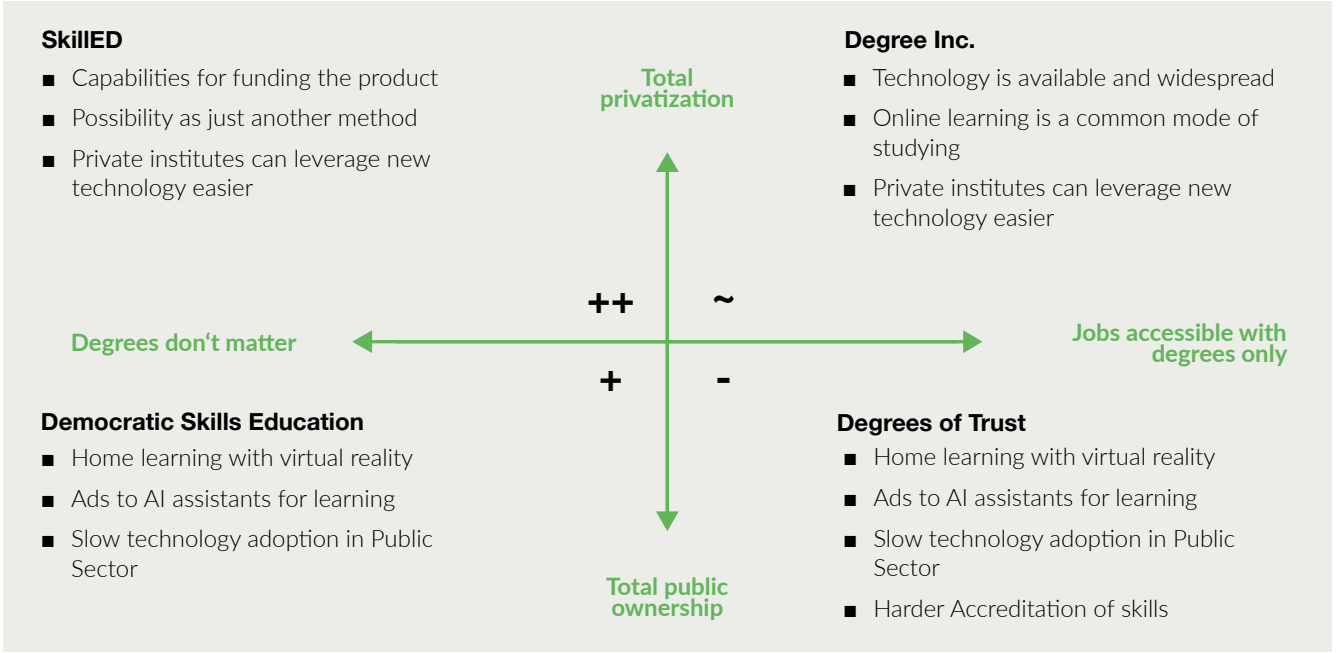
Depending on the targeted size and quality of the product, a team of coders, software engineers, testers and more will have to be employed on a permanent basis for maintaining the software and creating new content. Many game products have a high employment after the release in order to repair unnoticed broken program code (bug fix). With several million lines of code being usual for common software and games, this is a rather relentless task for the programmers.

Another recurring cost factor is the development of the algorithms in the background. While bug fixing is more concerned with the user experience of an already developed product, the progression of the algorithms will lead to an even better product. Better algorithms also protect from new competition. This section also contains porting the product to new platforms (other 3D glasses, etc.), the introduction of new languages, and product innovations.

Taking up on previous explanations, marketing also creates significant cost prior to and during the release of the product. Moreover, the mentioned sunk costs make it important for the marketing to be successful to make investments worthwhile and to create a rapidly growing business.

The distribution will be through app stores. While this makes analysis and distribution far easier, the store operators take a share of up to 30% of the retail price. A higher margin can be obtained by direct sales over VILA's own web site or VILA's own store, which would require another marketing campaign in order to create traffic to the point of sale.

Scenario Fit



Degrees of Trust

In the fourth scenario where education is entirely public and degrees matter, the service has distinct weaknesses. On the one hand, privately developed technologies might have some trouble creating traction on in a closed market. On the other hand, there is little incentive for the learners to become self-directed when they can't get any kind of certification for it. The solution for this problem might be as follows: purely B2G targeted marketing that sells the product as a platform to the public education providers. This same move can also solve the tension for certificates and thus motivate potential users in adapting the product. One point that might work in favor of the business is the implementation of new technologies and E-learning that is promoted by the scenario. Overall this scenario might be among the more challenging ones, since the business model would have to be capable of overcoming to multiple major functional and situational shifts in order to work properly on a sustainable basis.

Democratic Skills Education

Companies that don't care about degrees, while students get cheap access to public educational institutes define the first scenario. People are not willing to pay high sums of money for the necessary technology and content in order to gather new language skills. That is also the main reason why the service needs to refocus its marketing to the B2G sector in order to become the number one language learning content provider for the public educational institutes. An advantage is easy technology access for the broader public, because students and lifelong learners get everything provided from the department of education. Machine learning improvements as seen with Harry, the Virtual Teaching Assistant in the scenario make it possible to have fully artificial and interactive characters that can adapt their behavior to your skill and interest.

The business model has to be refined in order to survive in this scenario, but technological improvements and lower marketing costs make it possible to focus on the content creation and enhancement of the natural language processing algorithms.

Outlook

SkillED

Given a status quo of “degrees don’t matter” and a totally privatized educational market, the VILA business model shows strong robustness with respect to the second scenario. The technology required by the product, primarily virtual reality glasses and gesture recognition, are assumed to be widespread in society as described by the scenario.

The scenario also supports the assumption of very advanced speech recognition and natural language processing algorithms, far beyond the initial scope of what would be required for the realization of the product. Society and industry place a large focus on having skills, but less on obtaining an accredited degree. With online platforms like skillEd, which tracks and evaluates both theoretical knowledge and practical skills, or personal machine mentors that recommend courses based on past experiences and job interests,

VILA perfectly fits into this educational ecosystem. Therefore, the customers are offered the possibility to assume a very good command of a new language (skills-based). With decentralized learning being a very common mode of studying, it also aligns nicely with the desires of future students. The given outlook on tutoring between students within the scope of virtual reality adds more value to VILA, as new skills can be acquired and practiced.

Degree Inc.

VILA benefits also in this scenario by the spread of technology amongst the society. Pupils and students will use this app in order to prepare for certain entry requirements to begin an academic career, and other individuals will use this tool in order to prepare for final certificates, including degrees. Targeting the private consumer market, and focusing on people who want to learn a foreign language for future travels, might not be ideal in a scenario where degrees matter. In general, the business model fits into the Degree Inc. scenario of degrees and total privatization, although people who are preparing for their degrees should be the most important target group. Moreover, the business model is independent of the ownership of the teaching institutes.

The product can be extended in different aspects in order to increase the market potential. For example, haptics can be included to enhance the cultural experience. Haptics and motions can contribute together to simulate a more realistic environment and hence improve the learning experience. Currently, there are already some motion add-ons that are used alongside the Oculus Rift like the LEAP motion controller, but they are in an experimental stage. A major challenge at the moment is that there is no dominant design for incorporating haptic feedback in order to correct gestures and behaviors in a cognitive manner. Therefore, the technology can be implemented as soon as it has matured to a satisfactory level.

Based on the social learning theory, social interaction was proven to be paramount to the learning process of skills. [316] Therefore, it is without a doubt that in the near future artificial interactions will remain inferior to real ones. Hence, it would be interesting to introduce a kind of a multi-user mode. It could be used in one of two ways: first, to create peer to peer interactions amongst learners; second, to facilitate personal tutoring in the virtual world.

The classical leap in improving potential market size for language educational programs is the introduction of new language pair combinations. Although the entire program has to be redefined, the initial costs are reduced if there is a base original language. Similarly, the 3D animated world and interactions can be reused from the original program.

Since the current product is targeting mainly the market of lifelong learners, it might be interesting to tackle the K12 market as well. In order to achieve this, it will be necessary to create both an attractive pricing model and a program that is tailored to the demands of a standardized school curriculum.

Challenges

- Developing the proprietary natural language processing framework
- High development/sunk costs, therefore high demand for investment capital
- High marketing costs to achieve fast sales growth
- Potential cash flow issues due to capital lockup
- Building a market in the VR E-learning sector

List of Contributors

CDTM Class of Spring 2015

Irman Abdic
Computer Science

David Adrian
Electrical Engineering and Information Technology

Benjamin Borrow
Consumer Affairs

Benedikt Brandner
Computer Science

Michael Braun
Media Informatics

Bastian Burger
Management and Physics

Fabian Frank
Management and Technology, Psychology

Alexander Holzer
Media Informatics

Steffen Iwan
Mechanical Engineering and Management

Stephanie Korbely
Communication Studies

Annika Kreil
Business Administration and Political Sciences

Simon Maier
Business Administration

Michael Miksch
Business Administration

Asif Nadeem
Communications Engineering

Isabel Poppek
Management and Technology

Johannes Rausch
Computational Science and Engineering

Aishwarya Ravindran
Power Engineering

Julian Roos
Business Administration

Valentin Rüchardt
Computer Science

Ahmed Shafei
Computer Science

Maximilian Strobel
Computer Science

Stefan Tischinger
Computer Science

Nathalie Wilk
Consumer Affairs

Hassan Zaheer
Power Engineering

Board of Directors

Broy, Manfred, Prof. Dr. Dr. h.c.
Chair for Software and Systems Engineering
Technische Universität München

Brügge, Bernd, Prof., Ph.D.
Chair for Applied Software Engineering
Technische Universität München

Butz, Andreas, Prof. Dr.
Chair for Media Informatics
Ludwigs-Maximilians-Universität

Diepold, Klaus, Prof. Dr.-Ing.
Chair for Data Processing
Technische Universität München

Eberspächer, Jörg, Prof. Dr.-Ing.
Chair for Communication Networks
Technische Universität München

Harhoff, Dietmar, Prof., Ph.D., M.P.A.
Director at the Max Planck Institute for Innovation and Competition

Hegering, Heinz-Gerd, Prof. Dr.
Munich Network Management Team
Ludwigs-Maximilians-Universität

Hess, Thomas, Prof. Dr.
Chair for Information Systems and New Media
Ludwigs-Maximilians-Universität

Kellerer, Wolfgang, Prof. Dr.-Ing.
Chair for Communication Networks
Technische Universität München

Kranzlmüller, Dieter, Prof. Dr.-Ing.
Chair for Communication Systems and Systems Programming
Ludwigs-Maximilians-Universität,
Munich Network Management Team,
Leibniz Supercomputing Center

Krcmar, Helmut, Prof. Dr.
Chair for Information Systems
Department of Informatics
Technische Universität München

Kretschmer, Tobias, Prof. Dr.
Chair for Strategy, Technology and Organization
Ludwigs-Maximilians-Universität

Picot, Arnold, Prof. Dr. Dres h.c.
Chair for Information, Organization and Management
Ludwigs-Maximilians-Universität

Spann, Martin, Prof. Dr.
Chair for Electronic Commerce and Digital Markets
Ludwigs-Maximilians-Universität

Welpe, Isabell, Prof. Dr.
Chair for Strategy and Organisation
Technische Universität München

Management Team

Bechthold, Laura
M.Sc. Sustainability Science and Policy

Moser, Kilian
Dipl.-Kfm.

Christ, Patrick
M.Sc. Physics

Nägelein, Philipp
M.Sc. Strategic. Management

Engelken, Maximilian
Dipl. Wi-Ing.

Nothelfer, Stefan
Dipl. Wirtsch.-Ing.

Gamper, Veronika
Dipl.-Ing.

Lachner, Florian
M.Sc. Mechanical Engineering and Management

Jablonka, Claudius
Dipl.-Kfm.

Other Publications

2014

The Future of Individual Premium Mobility
ISBN: 978-3-9815538-6-4
2014

Sensor-based Authentication
ISBN: 978-3-9815538-5-7
2014

2013

Data Marketplaces in Smart Cities
ISBN: 978-3-9815538-3-3
2013

Human-Machine-Interaction in Individual Mobility
ISBN: 978-3-9815538-2-6
2013

2012

The Future of Real-Time Communication
ISBN: 978-3-9815538-1-9
2012

The open-closed spectrum - Challenging the Boundaries of Business Systems
ISBN: 978-3-9815538-0-2
2012

Sources

1. BMW. Bmw.de (09.03.2015). [Internet]. 2015 Available from: http://www.bmw.de/de/footer/publications-links/technology-guide/head-up-display.html.
2. Paolo Montuschi ASFLaGP. Computer.org (09.03.2015). [Internet]. 2014 Available from: http://www.computer.org/web/computingnow/archive/september2014.
3. Caroll JM. Human Computer Interaction - brief intro. In: Soegaard MaDRF. The Encyclopedia of Human-Computer Interaction, 2nd Ed. 2014.
4. M. Ziefle EMJ. New Challenges in Human Computer Interaction. International Conference on Competitive Manufacturing; 2010.
5. Madden M,LA,DM,CS,&GU. Teens and Technology 2013. 2013. p. 2,4.
6. Burns J. Elucidat.com (09.03.2015). [Internet]. 2014 Available from: https://www.elucidat.com/blog/mobile-learning-statistics-for-2014-6-trends-you-need-to-know.
7. PocketGamer.biz. Statista.com (09.03.2015). [Internet]. 2015 Available from: http://www.statista.com/statistics/270291/popular-categories-in-the-app-store/.
8. Duolingo. Duolingo.com (09.03.2015). [Internet]. 2015 Available from: https://www.duolingo.com/.
9. OECD. Trends Shaping Education 2013. 2013.
10. Hashemis M. What is Mobile learning? 2011.
11. Saylor M. The Mobile Wave: How Mobile Intelligence Will Change Everything. 2012.
12. Wu ea. Review of trends from mobile learning studies. 2011.
13. Sagiroglu S,&SD. Big data: A review. 2013 International Conference on Collaboration Technologies and Systems (CTS). 2013 Mai:42-47.
14. Wikobon. Statista.com.03.2015). [Internet]. 2014 Available from: http://de.statista.com.eaccess.ub.tum.de/statistik/daten/studie/265253/umfrage/prognose-zum-umsatz-mit-big-data-loesungen-weltweit/.
15. Gartner. Gartner.com (09.03.2015). [Internet]. 2014 Available from: http://www.gartner.com/newsroom/id/2819918.
16. UMN. twin-cities.umn.edu. [Internet]. 2014 Available from: https://hypecycle.umn.edu/hype-cycle-technologies/big-data.
17. McKinsey. McKinsey.com (09.03.2015). [Internet]. 2015 Available from: http://www.mckinsey.com/insights/business_technology/getting_big_impact_from_big_data.
18. BITKOM. statista.com (09.03.2015). [Internet]. 2015 Available from: http://de.statista.com.eaccess.ub.tum.de/statistik/daten/studie/380843/umfrage/die-wichtigsten-trends-in-der-itk-branche/.
19. LLC NP. Big Data Executive Survey 2014: An Update on the Progress of Big Data in the Large Corporate World. 2014.
20. Baker R. Coursera. [Internet]. 2013 Available from: https://www.coursera.org/course/bigdata-edu.
21. Naughton J. Guardian.com (09.03.2015). 2014:http://www.theguardian.com/technology/2014/jun/08/big-data-mined-real-winners-nsa-gchq-surveillance.
22. NewVantage. NewVantage Big Data Executive Survey 2014: Corporate Big Data Investment Surges Forward. 2014.
23. Berger ML,&DV. Big data, advanced analytics and the future of comparative effectiveness research. Journal of comparative effectiveness research, 3(2). 2014:167-176.
24. Adhani NI,&ARDR. A survey of mobile augmented reality applications. In 1st International Conference on Future Trends in Computing and Communication Technologies.; 2012. p. 89-96.
25. Wen H. Computerworld.com (09.03.2015). [Internet]. 2010 Available from: http://www.computerworld.com/article/2522825/mobile-apps/augmented-reality--pure-hype-or-next-big-thing-in-mobile-.html.
26. Juniper Research. Statista.com (09.03.2015). [Internet]. 2013 Available from: http://www.statista.com/statistics/282453/mobile-augmented-reality-market-size/.
27. Juniper Research. Juniperresearch.com (09.03.2015). [Internet]. 2014 Available from: http://www.juniperresearch.com/press-release/augmented-reality-pr2.
28. Demgen A. Netzwelt.de (09.03.2015). [Internet]. 2013 Available from: http://www.netzwelt.de/news/96461-google-glass-neue-tester-beta-phase-explorer-gesucht.html.
29. Times TNY. nytimes.com (09.03.2015). [Internet]. 2015 Available from: http://www.nytimes.com/2015/02/05/style/why-google-glass-broke.html?smid=nytcore-iphone-share&smprod=nytcore-iphone&_r=0.
30. Sachin R. reuters.com (09.03.2015). [Internet]. 2014 Available from: http://www.reuters.com/article/2014/10/21/us-magicleap-funding-idUSKCN0I-A18K20141021.
31. Smith D. businessinsider.com. [Internet]. 2015 Available from: http://uk.businessinsider.com/microsoft-windows-holographic-2015-1?r=US.
32. Ramirez M. timeshighereducation. [Internet]. 2015 Available from: [http://www.timeshighereducation.co.uk/news/augmented-reality-in-higher-education-five-tips-to-get-started/2018933.article].
33. Gartner. Gartner.com (09.03.2015). [Internet]. 2014 Available from: http://www.gartner.com/newsroom/id/2819918.
34. Szymczyk M. venturebeat.com. [Internet]. 2014 Available from: http://venturebeat.com/2014/05/29/augmented-reality-wheres-the-venture-capital/.
35. Bell K. mashable.com (09.03.2015). [Internet]. 2014 Available from: http://mashable.com/2014/04/07/google-glass-privacy/.
36. Business Wire. businesswire.com (09.03.2015). [Internet]. 2013 Available from: http://www.businesswire.com/news/home/20131220006016/en/Research-Markets-Global-Augmented-Reality-Market-2014-2018.
37. AR.org. augmentedreality.org (09.03.2015). [Internet]. 2014 Available from: http://www.augmentedreality.org/#!smartglassesreport/c88h.
38. Koetsier J. venturebeat.com (09.03.2015). [In-

ternet]. 2013 Available from: http://venturebeat.com/2013/11/06/smartphones-smart-glasses-augmented-reality-to-jump-333-by-2018/.

39. Dunleavy M,DC,&MR. Affordances and limitations of immersive participatory augmented reality simulations for teaching and learning. Journal of Science Education and Technology, 18(1). 2009:7-22.
40. Richards J,&WJ. Digital Teaching Platforms in the Spectrum of Educational Technologies. Digital Teaching Platforms: Customizing Classroom Learning for Each Student. 2012.
41. Peasgood S. Latest Trend In Edtech – BYOD.; 2014.
42. Google Classroom. [Internet]. Available from: https://classroom.google.com/.
43. EDUROAM. [Internet]. Available from: [3] https://www.eduroam.org/index.php?p=where 09/03/2015.
44. Madden M,LA,DM,CS,&GU. Teens and technology 2013. Washington, DC: Pew Internet & American Life Project. 2013.
45. McAuley A,SB,SG,&CD. The MOOC model for digital practice. (2010).
46. EFMD. [Internet]. Available from: http://www.efmd.org/blog/view/250-white-paper-moocs-massive-open-online-courses.
47. Shah D. MOOCs in 2013: breaking down the numbers. Ed Surge. 2013).
48. Coursera. [Internet]. Available from: http://blog.coursera.org/post/64907189712/a-triple-milestone-107-partners-532-courses-5-2.
49. Open Education Europa. [Internet]. Available from: http://www.openeducationeuropa.eu/en/news/latest-tally-shows-12-global-growth-moocs.
50. FORBES. [Internet]. Available from: http://www.forbes.com/sites/georgeanders/2013/07/10/coursera-hits-4-million-students-and-triples-its-funding/.
51. Chen X,BDR,&SC. Fad or future: The advantages and challenges of massive open online courses (MOOCs). In Research-to Practice Conference in Adult and Higher Education.
52. Katy Jordan. [Internet]. Available from: http://www.katyjordan.com/MOOCproject.html.
53. Hew KF,&CWS(. Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges.. 2014.
54. Coursera. [Internet]. Available from: http://blog.coursera.org/post/61047298750/a-milestone-for-signature-track-certificates-for.
55. Kohavi R, Provost F. Glossary of terms. In: Kohavi R, Provost F. Machine Learning. 1998. p. 271-274.
56. Tuomi I. The lives and death of Moore's Law. In: Tuomi I. The lives and death of Moore's Law. First Monday; 2002. p. 11.
57. Simon HA. Invariants of human behavior. In: Simon HA. Annual review of psychology. 1990. p. 1-20.
58. Gartner's 2014 Hype Cycle for Emerging Technologies Maps the Journey to Digital Business. [Internet]. 2014 Available from: http://www.gartner.com/newsroom/id/2819918.
59. Madrigal AC. The Trick That Makes Google's Self-Driving Cars Work. [Internet]. 2015 Available from: http://www.theatlantic.com/technology/archive/2014/05/all-the-world-a-track-the-trick-that-makes-googles-self-driving-cars-work/370871/.
60. Getting Started. [Internet]. 2015 Available from: https://cloud.google.com/prediction/docs/getting-started.
61. Machine Learning. [Internet]. 2015 Available from: http://reference.wolfram.com/language/guide/MachineLearning.html.
62. Szolovits P. Artificial intelligence in medicine. Boulder, CO: Westview Press; 1982.
63. Rotman D. How technology is destroying jobs. In: Rotman D. Technology Review. 2013. p. 28-35.
64. Excell J, Nathan S. The rise of additive manufacturing. [Internet]. 2015 Available from: http://www.theengineer.co.uk/in-depth/the-big-story/the-rise-of-additive-manufacturing/1002560.article.
65. Alec. Design firm opens service for 3D printed chocolate molds and chocolate art. [Internet]. 2015 Available from: http://www.3ders.org/articles/20150304-design-firm-opens-service-for-3d-printed-chocolate-molds-and-ch.
66. 3D Printing Trends March 2015. [Internet]. 2015 Available from: https://www.3dhubs.com/trends.
67. Gartner Says Worldwide Shipments of 3D Printers to Reach More Than 217,000 in 2015. [Internet]. 2015 Available from: http://www.gartner.com/newsroom/id/2887417.
68. 3D Printing Trends October 2014. [Internet]. 2015 Available from: https://www.3dhubs.com/trends/2014-october.
69. Munoz C, Kim C, Armstrong L. Layer-by-Layer: Opportunities in 3D printing. [Internet]. 2015 Available from: http://www.marsdd.com/wp-content/uploads/2014/04/MAR-CLT6965_3D-Printing_White_paper.pdf.
70. In: Canessa E, Fonda C, Zennaro M. Low--cost 3D Printing for Science, Education and Sustainable Development. 2013. p. 15.
71. Blackboard. Teaching in the 21st century - A Review of the Issues and Changing Models in the Teaching Profession. Washington, DC: Blackboard; 2008.
72. Federal ministry of Education and Research, Germany. Lifelong learning. [Internet]. Available from: http://www.bmbf.de/en/lebenslangeslernen.php.
73. Welsh MJ. PIPCA Pennsylvania CPA Journal. [Internet]. 2013 [cited 2015 March 9]. Available from: http://www.picpa.org/Content/46331.aspx.
74. Bergmann J, Sams A. Flipped learning - Maximizing Face Time. TD Magazine. 2014 February 8:28-31.
75. Head A, Eisenberg M. SSRN: Social Science Research Network. [Internet]. 2010 [cited 2015 March 9]. Available from: http://ssrn.com/abstract=2281485.
76. David J. Deming CGLFKNY. Can online learning bend the higher education cost curve?. Cambridge: NATIONAL BUREAU OF ECONOMIC RESEARCH; 2015.
77. Persico D, Stefania M, Francesca P. Adapting the Technology Acceptance Model to evaluate the innovative potential of e-learning systems. Computers in Human Behavior. 2014 January:614-622.
78. Carr A. The Most Important Leadership Quality for CEOs? Creativity. [Internet]. 2010 [cited 2015 March 7].

Available from: http://www.fastcompany.com/1648943/most-important-leadership-quality-ceos-creativity.

79. Cole M. Using Wiki technology to support student engagement: Lessons from the trenches. Computers & education. 2009;51(1):141-146.

80. Ladwig P, Dalrymple K. Perceived familiarity or factual knowledge? Comparing operationalizations of scientific understanding. Science and Public Policy. 761-774.

81. Kurutz S. One Big Workbench. [Internet]. 2013 [cited 2015 March 6]. Available from: http://www.nytimes.com/2013/05/02/garden/the-rise-of-the-hacker-space.html?_r=2.

82. Livingstone S. Taking risky opportunities in youthful content creation: teenagers' use of social networking sites for intimacy, privacy and self-expression. New Media & Society. 2008;10(3):393-411.

83. Hargadon S. Web 2.0 for content learning and teaching and teaching higher education. New York: Elluminate; 2009.

84. Kücklich J. Play and Playability as Key Concepts in New Media Studies. In: STeM Centre; 2004; Dublin.

85. NMC. Horizon Report > 2015 Higher Education Edition. Austin: The New Media Consortium; 2015.

86. Andersen MH. The World Is My School. The Futurist. 2011 January 1:12-17.

87. Nair P. 30 Strategies for Education Innovation. New York: designshare.com; 2007.

88. Lee H, Templeton R. Ensuring Equal Access to Technology: Providing Assistive Technology for Students With Disabilities. Ohio: Routledge; 2008.

89. Seaman IEAaJ. Changing Course: Ten Years of Tracking Online Education in the United States. U.S.: Babson Survey Research Group, Quahog Research Group; 2013.

90. VanderVeen A, Sheltrown N. Personalization, Possibilities and Challenges with Learning Analytics. [Internet]. 2014 [cited 2015 March 9]. Available from: https://www.edsurge.com/n/2014-10-30-opinion-personalization-possibilities-and-challenges-with-learning-analytics.

91. Accessible Technology Coalition. Future of Assistive Technology. [Internet]. [cited 2015 March 9]. Available from: http://atcoalition.org/article/future-assistive-technology.

92. Kiyao R. Democratization of education: A Tanzania Case. Paris: UNESCO; 1981.

93. Michael Barber KDSR. An Avalanche Is Coming. London: Institute for Public Policy Research; 2013.

94. Elaine Allen JS. Changing Course: Ten Years of Tracking Online Education in the United States. 2013.

95. Kahn Academy. Khan Academy. [Internet]. 2015 [cited 2015 March 09]. Available from: https://khanacademy.zendesk.com/hc/en-us/articles/202483630-Press-room.

96. Jaggars SS. Association of American Colleges & Universities. [Internet]. 2014 [cited 2015 March 09]. Available from: http://www.aacu.org/diversitydemocracy/2014/winter/jaggars.

97. By Li Yuan SP. MOOCs and Open Education: Implications for Higher Education. University of Bolton; 2013.

98. Goldman C. Wise-qatar.org. [Internet]. [cited 2015 March 09]. Available from: http://www.wise-qatar.org/higher-education-tuition.

99. Leonhardt D. Econmix. [Internet]. 2011 [cited 2015 March 09]. Available from: http://economix.blogs.nytimes.com/2011/06/25/why-college-brings-a-huge-return/.

100. Di Xu SSJ. The Effectiveness of Distance Education Across Virginia's Community Colleges: Evidence From Introductory College-Level Math and English Courses. Columbia University; 2010.

101. Okan Z. Edutainment: is learning at risk? British Journal of Educational Technology. 2003;34(2):255-264.

102. Ma M, Oikonomou A, Jain L. Serious games and edutainment applications. London: Springer-Verlag; 2011.

103. Pan Z. Transactions on edutainment. Berlin: Springer; 2008.

104. Carnegie Mellon University. App of the Year. [Internet]. [cited 2015 March 9]. Available from: http://www.cmu.edu/homepage/society/2013/fall/app-of-the-year.shtml.

105. Lawler R. 500M views in 5 years: How TEDTalks did it. [Internet]. 2011 [cited 2015 March 8]. Available from: https://gigaom.com/2011/06/27/tedtalks-5-years/.

106. Tack D. Serious Games And The Future Of Education. [Internet]. 2013 [cited 2015 March 8]. Available from: http://www.forbes.com/sites/danieltack/2013/09/12/serious-games-and-the-future-of-education/.

107. Nicastro D. Gartner Sticks to its Failing Gamification Prediction. [Internet]. 2013 [cited 2015 March 8]. Available from: http://www.cmswire.com/cms/social-business/gartner-sticks-to-its-failing-gamification-prediction-023464.php#null.

108. Addis M. New Technologies and cultural consumption - edutainment is born! European Journal of Marketing. 2005;39(8):729-736.

109. Zichermann G, Cunningham C. Gamification by Design. Sebastopol: O'Reilly Media; 2011.

110. Gartner. Gartner Says By 2015, More Than 50 Percent of Organizations That Manage Innovation Processes Will Gamify Those Processes. [Internet]. 2011 [cited 2015 February 8]. Available from: http://www.gartner.com/newsroom/id/1629214.

111. McGonigal J. We Don't Need no Stinking Badges: How to Re-Invent Reality Without Gamification. In: GDC 2011; 2011.

112. Gartner. Gartner Says by 2014, 80 Percent of Current Gamified Applications Will Fail to Meet Business Objectives Primarily Due to Poor Design. [Internet]. 2012 [cited 2015 March 8]. Available from: http://www.gartner.com/newsroom/id/2251015.

113. Gatner. Gartner Predicts Over 70 Percent of Global 2000 Organisations Will Have at Least One Gamified Application by 2014. [Internet]. 2011 [cited 2015 March 9]. Available from: http://www.gartner.com/newsroom/id/1844115.

114. NIACE Annual report. 2012.

115. Doernyei Z. The psycholg of the language learner revisited. New York: Routledge; 2005.

116. EuBiA. EuBiA. [Internet]. 2010 [cited 2015 March 9]. Available from: www.bia-net.org/eubia.

117. Aspin DN,CJD,EK,BR. Second international handbook of lifelong learning. Springer Netherlands; 2012. p. 887-894.

118. Learntec. Learntec. [Internet]. 2009 [cited 2015 March 9]. Available from: http://glossar.learntec.de/index.php?id=186.

119. Riel M.. „Education in the 21st century: Just-in-time learning or learning communities." Fourth Annual Conference of the Emirates Center for Strategic Studies and Research, Abu Dhabi. 1998.

120. Tulgan B. Trainingmag. [Internet]. 2013 [cited 2015 March 9]. Available from: http://www.trainingmag.com/content/learning-just-time.

121. B2cuteCupcakes. Youtube. [Internet]. 2014 [cited 2015 March 9]. Available from: https://www.youtube.com/watch?v=C_W8vHCOKHA.

122. Coursera. Coursera. [Internet]. 2015 [cited 2015 March 9]. Available from: https://www.coursera.org/.

123. Govaerts N,KE,DF,&BH. Influence of learning and working climate on the retention of talented employees. Journal of Workplace Learning. 2009:35–55.

124. O'Leonard K. The Corporate Learning Factbook 2014: Benchmarks, Trends and Analysis of the U.S. Training Market. Bersin; 2014.

125. Kyndt E,DF,MM,&MB. Employee Retention: Organisational and Personal Perspectives. Vocations and Learning. 2009:195–215.

126. Tynjälä P. Perspectives into learning at the workplace. Educational Research Review. 2008:130-154.

127. American Society for Training & Development. 2013 Research State of the Industry. Association for Talent Development; 2013.

128. Svensson L,EP,&ÅC. Integrating formal and informal learning at work. Journal of Workplace Learning. 2004:479-491.

129. Blass E. The rise and rise of the corporate university. Journal of European Industrial. 2005:58–74.

130. Dunlap JC,&LPR. Learning, unlearning, and relearning: Using Web 2.0 technologies to support the development of lifelong learning skills. In G. D. Magoulas (Ed.), E-infrastructures and technologies for lifelong learning: Next environments. Hershey, PA: IGI Global; 2011.

131. Cobb J. The Future of the Lifelong Learning Market: 10 Critical Insights. [Internet]. 2015 Available from: http://www.tagoras.com/2014/02/17/future-lifelong-learning/.

132. Bersin J,HJ,PB&VB. Global Human Capital Trends 2014: Engaging the 21st - century workforce. Deloitte Consulting LLP and Bersin, Deloitte University Press. ; 2014.

133. Thyagharajan KK,&NR. Adaptive Content Creation for Personalized e-Learning Using Web Services. Journal of Applied Sciences Research. 2007 828–836.

134. Egan TM,YB,&BKR. The effects of organizational learning culture and job satisfaction on motivation to transfer learning and turnover intention. Human Resource Development Quarterly. 2004 279–301.

135. Paludan JP. Personalised Learning 2025.. Personalising Education, OECD/CERI. 2006 1–11.

136. Fournier H,KR,&SH. The Value of Learning Analytics to Networked Learning on a Personal Learning Environment. Proceedings of the 1st International Conference on Learning Analytics and Knowledge. New York, NY 2011.

137. Walker J. School's in Session at Google. The Wall Street Journal. 2012.

138. The Glossary of Education Reform. Blended Learning. 2013.

139. Vernau K,&HM. Corporate Learning goes Digital: How companies can benefit from online education. Roland Berger Strategy Consultants Publications; 2014.

140. Broadfoot P,TS,PS,OA,&SR. Learning analytics and technology enhanced assessment (TEA). Bristol, England 2013.

141. Zhang D, Nunamaker, J. F. Powering e-Learning in the new millennium: An overview of e-Learning and enabling technology. Information Systems Frontiers; 2003. doi:10.1023/A:1022609809036.

142. Vernau K, Hauptmann M. Corporate Learning goes Digital: How companies can benefit from online education. Roland Berger Strategy Consultants Publications; 2014.

143. Trainingmag. 2014 Training: Industry Report. Trainingmag Publications; 2014.

144. Mandzuk C, Frankel D, McDonald A, Miller L. 2013: State of the Industry (Vol. 10, pp. 727–729). American Society for Training & Development; 2013. doi:10.1016/j.jacr.2013.05.035.

145. Cross J, Moore M, Graham C, Bonk C. Handbook of Blended Learning: Global Perspectives, Local Designs. San Francisco (CA): Pfeiffer Publishing; 2004.

146. Docebo. E-Learning Market Trends & Forecast 2014 - 2016 Report. Docebo Publications; 2014.

147. Adkins SS. The Worldwide Market for Self-paced eLearning Products and Services: 2010-2015 Forecast and Analysis. 2011.

148. Weippl ER. Security in e-learning. E-Learn Magazine. 2005.

149. May M, George S. Privacy Concerns in E-learning: Is Using Tracking System a Threat?. 2012.

150. Adkins SS. The 2012-2017 Worldwide Mobile Learning Market. 2013.

151. Dobbs R,MA,BD,LE,MJ,RC,LS,&MS. The world at work: Jobs, pay, and skills for 3.5 billion people. McKinsey Global Institute; 2012.

152. OECD. Education at a Glance 2014: OECD indicators. OECD Publishing; 2011.

153. Bielick S,CS,SC,MJM,&RSB. The Adult Training and Education Survey (ATES) Pilot Study: Technical Report (NCES 2013-190). Washington, DC: U.S. Department of Education; 2013.

154. Udacity. Open Education Alliance: Create the workforce of tomorrow. [Internet]. 2015 Available from: https://www.udacity.com/open-ed.

155. Coursera. Coursera Specializations: Focused Programs in Popular Fields. [Internet]. 2015 Available from: http://blog.coursera.org/post/73994272513/coursera-specializations-focused-programs-in.

156. European Commission. Communication from the Commission Europe 2020: A strategy for smart, sustainable and inclusive growth. European Commission; 2010.

157. European Centre for the Development of Vocational Training. Future skills supply and demand in Europe: Forecast 2012 (No. 26).. Luxembourg 2012.

158. American Council on Education. ACE to Assess Potential of MOOCs, Evaluate Courses for Credit-Worthiness. [Internet]. 2015 Available from: http://www.acenet.edu/news-room/Pages/ACE-to-Assess-Potential-of-MOOCs-Evaluate-Courses-for-Credit-Worthiness.aspx.

159. Coursera. Five Courses Receive College Credit Recommendations. [Internet]. 2015 Available from: http://blog.coursera.org/post/42486198362/five-courses-receive-college-credit.

160. Ewert S,&KR. Measuring Alternative Educational Credentials : 2012 Household Economic Studies. United States Census Bureau; 2014.

161. Bryant A. In Head-Hunting, Big Data May Not Be Such a Big Deal. [Internet]. 2015 Available from: http://www.nytimes.com/2013/06/20/business/in-headhunting-hunting-big-data-may-not-be-such-a-big-deal.html.

162. Burning Glass Technologies. Moving the Goalposts: How Demand for a Bachelor's Degree is Reshaping the Workforce. Burning Glass Technologies Publications; 2014.

163. Yang D,ST,AD,&PRC. "Turn on, Tune in, Drop out": Anticipating student dropouts in Massive Open Online Courses. In: NIPS Data-Driven Education Workshop; 2013. p. 1-8.

164. Arnone M. Corporate universities: a viewpoint on the challenges and best practices. Career Development International. 1998:199–205.

165. Blass E. The rise and rise of the corporate university. Journal of European Industrial Training. 2005:58-74.

166. Fulmer RM,&GPA. Lifelong learning at the corporate university. Career Development International. 2012:177–184.

167. Allen M. The Next Generation of Corporate Universities: Innovative Approaches for Developing People and Expanding Organizational Capabilities. San Francisco: Pfeiffer.; 2007.

168. McAteer P,&PM. The Business Case for Creating a Corporate University. Corporate University Xchange. 2011:1–13.

169. Schmidt SW. The relationship between satisfaction with workplace training and overall job satisfaction. Human Resource Development Quarterly. 2007:481–498.

170. Kolo P,SR,CP,TR,&BV. Corporate Universities: An Engine for Human Capital. Boston Consulting Group Report; 2013.

171. Powell WW, Snellman K. The Knowledge Economy. Annual Review of Sociology, 30(1). 2004:199-220.

172. Bughin J, Manyika J. How businesses are using Web 2.0 : A McKinsey Global Survey. McKinsey Quarterly, (March). 2007:1–16.

173. Meyer AD, Vereecke A. How to optimize knowledge sharing in a factory network. McKinsey Quarterly, (September). 2009:1-7.

174. Dyer JH, Nobeoka K. Creating and managing a high-performance knowledge-sharing network: the Toyota case. Strategic Management Journal, 21(3). 2000:345-367.

175. Durcikova A, Everard A. Managing the Corporate Zoo : A Knowledge Management Perspective. Journal of Knowledge Management, 2(1). 2004:13-18.

176. Hsu IC. Knowledge sharing practices as a facilitating factor for improving organizational performance through human capital: A preliminary test. Expert Systems with Applications, 35(3). 2008:1316-1326.

177. McDermott R, O'Dell C. Overcoming cultural barriers to sharing knowledge. Journal of Knowledge Management, 5(1). 2001:76-85.

178. Smith HA, McKeen JD. Instilling a knowledge-sharing culture. Queen's Centre for Knowledge-Based Enterprises, 20(1). 2003:1-17.

179. Hsu IC. Enhancing employee tendencies to share knowledge - Case studies of nine companies in Taiwan. International Journal of Information Management, 26(4). 2006:326-338.

180. ProSiebenSat.1. ProSiebenSat.1 Academy. [Internet]. 2015 [cited 2015 March 6]. Available from: http://www.prosiebensat1.de/de/karriere/karriere-bei-prosiebensat1/ihre-entwicklung.

181. Blass E. The rise and rise of the corporate university. Journal of European Industrial Training, 29(1). 2005:58–74.

182. Tsai W. Social structure of "coopetition" within a multiunit organization: Coordination, competition, and intraorganizational knowledge sharing. Organization Science, 13(2). 2002:179-190.

183. Holdt Christensen P. Knowledge sharing: moving away from the obsession with best practices. Journal of Knowledge Management, 11(1). 2007:36-47.

184. Cummings JN. Work Groups, Structural Diversity, and Knowledge Sharing in a Global Organization. Management Science, 50(3). 2004:352–364.

185. Yang HL, Wu TCT. Knowledge sharing in an organization. Technological Forecasting and Social Change, 75(8). 2008:1128-1156.

186. Riege A. Three-dozen knowledge-sharing barriers managers must consider. Journal of Knowledge Management, 9(3). 2005:18-35.

187. Ardichvili A, Page V, Wentling T. Motivation and barriers to participation in virtual knowledge-sharing communities of practice. Journal of Knowledge Management, 7(1). 2003:64–77.

188. Riege A. Actions to overcome knowledge transfer barriers in MNCs. Journal of Knowledge Management, 11(1). 2007:48-67.

189. Bughin J, Chui M. The rise of the networked enterprise: Web 2.0 finds its payday. McKinsey on Business Technology, (22). 2011:1–9.

190. Neches R, Fikes R, Finin T, Gruber T, Patil R, Senator T, Swartout WR. Enabling Technology for Knowledge Sharing. AI Magazine, 12(3). 1991:36-56.

191. OECD. 2011.

192. Cobo C. Mechanisms to identify and study the demand for innovation skills in world?renowned organizations. On the Horizon, 21(2), 96–106. 2013.

193. Trowbridge T. Seeking Creative Candidates: Hiring for the Future. Adobe Education Publications; 2014.

194. MacCormack A,FT,BP,&KP. Innovation through Global Collaboration: A New Source of Competitive Advantage. Boston, MA 2007.

195. Association for Talent Development. AMA Reports:10 Trends Shaping Training & Development. [Internet]. 2014 [cited 2015 Mar 08]. Available from: https://www.td.org/Publications/Blogs/Learning-Executive-Blog/2014/04/AMA-Reports-10-Trends-Shaping-LD.

196. Eckert R,DJ,BP,&HB. Leaders for the Future Nurturing Generation Y. Developing Leaders. 2012.

197. Schiffer B. [Slack to the Rescue] What You Want to Do. [Internet]. 2012 [cited 2015 Mar 07]. Available from: http://agiletrail.com/2012/01/09/slack-to-the-rescue-what-you-want-to-do/.

198. Tomasco S. IBM 2010 Global CEO Study: Creativity Selected as Most Crucial Factor for Future Success. IBM; 2010.

199. Hempel J. Pixar University: Thinking Outside The Mouse. [Internet]. 2003 [cited 2015 Mar 08]. Available from: http://www.sfgate.com/news/article/Pixar-University-Thinking-Outside-The-Mouse-2611923.php.

200. Chronus. Why Corporate Mentoring? Five benefits of a workplace mentoring program. Chronus - Mentoring & Talent Development Solutions, 1–9. [Internet]. 2013 [cited 2015 Mar 08]. Available from: http://chronus.com/resources/five-benefits-of-a-workplace-mentoring-program.

201. O'Leonard K. The Corporate Learning Factbook® 2014: Benchmarks, Trends and Analysis of the U.S. Training Market. 2014.

202. Deloitte. Mind the gaps: The 2015 Deloitte Millennial survey. Deloitte Millennial Survey. 2015.

203. McKenzie D. Hard measurement of Soft Skills. [Internet]. 2014 [cited 2015 Mar 08]. Available from: http://blogs.worldbank.org/impactevaluations/hard-measurement-soft-skills.

204. Bennett BN,BR,DS,HJ,&WJ. Transforming Technology Companies: Putting People First. Boston Consulting Group Report, (November). Boston Consulting Group; 2014. Available from: https://www.bcgperspectives.com/content/articles/human_resources_hardware_software_transforming_technology_companies/.

205. Manktelow J. Meeting the Soft Skills Challenge: How Organizations Can Radically Improve Performance and Reduce Costs Using Online Soft Skills Training Communities. 2009.

206. 100K Strong. [Internet]. [cited 2015 March 01]. Available from: http://100kstrong.org/about-us/supporters/.

207. Erasmus+. [Internet]. [cited 2015 March 01]. Available from: http://ec.europa.eu/programmes/erasmus-plus/index_en.htm.

208. Federal Foreign Office, Germany. [Internet]. [cited 2015 March 05]. Available from: http://www.auswaertigesamt.de/EN/Aussenpolitik/RegionaleSchwerpunkte/Naher-MittlererOsten/Umbrueche_TSP/TUN-Transformations%20-node.html.

209. German Academic Exchange Service. DAAD. [Internet]. [cited 2015 March 05]. Available from: https://www.daad.de/en/.

210. The News International. Afghan Students to Study in Pakistan. [Internet]. 2015 [cited 2015 March 05]. Available from: http://www.thenews.com.pk/Todays-News-5-303044-Afghan-students-to-study-at-LUMS.

211. Dr. Rosa Becker. INTERNATIONAL HIGHER EDUCATION COLLABORATION IN THE SOUTH. [Internet]. 2012 [cited 2015 March 05]. Available from: https://www.nuffic.nl/en/library/international-higher-education-collaboration-in-the-south-worldwide-developments.pdf.

212. EHEA. European Higher Education Authority. [Internet]. [cited 2015 March 01]. Available from: http://www.ehea.info/.

213. US Dept. of State. 100K Americas. [Internet]. [cited 2015 March 01]. Available from: http://www.state.gov/p/wha/rt/100k/index.htm.

214. USAID. USAID Education. [Internet]. [cited 2015 March 01]. Available from: http://www.usaid.gov/education.

215. Ministry of Education G. The Education System in the Federal Republic of Germany 2011/2012. [Internet]. 2012 [cited 2015 March 01]. Available from: http://www.kmk.org/fileadmin/doc/Dokumentation/Bildungswesen_en_pdfs/dossier_en_ebook.pdf.

216. Fulbright. Fulbright Scholar Program. [Internet]. [cited 2015 March 01]. Available from: http://www.cies.org/.

217. European University Association. Stronger Universities For Europe. [Internet]. [cited 2015 March 01]. Available from: http://www.eua.be/eua-work-and-policy-area/building-the-european-higher-education-area/bologna-basics/Bologna-an-overview-of-the-main-elements.aspx.

218. OECD. PISA - Internationale Schulleistungsstudie der OECD. [Internet]. 2015 Available from: http://www.oecd.org/berlin/themen/pisa-internationaleschulleistungsstudiederoecd.htm.

219. Tagesschau. Die Hochschulen vergessen ihr Kerngeschäft. [Internet]. 2015 Available from: http://www.tagesschau.de/inland/bologna-prozess100.html.

220. Finnish National Board of Education. Education policy. [Internet]. 2015 Available from: http://www.oph.fi/english/education_system_education_policy.

221. U.S. Department of Education. The federal Role in Education. [Internet]. 2015 Available from: http://www2.ed.gov/about/overview/fed/role.html.

222. TaylorWessing. TaylorWessing. [Internet]. 2015 Available from: http://www.taylorwessing.com/globaldatahub/article_2014_ec_regulation.html.

223. TaylorWessing. TaylorWessing. [Internet]. 2015 Available from: http://www.taylorwessing.com/globaldatahub/article_2014_predictions_2015.html.

224. University of York. Data Protection Act. [Internet]. 2015 Available from: http://www.york.ac.uk/admin/hr/resources/policy/dpa_1998.htm.

225. European Parliament. General Data Protection Regulation. [Internet]. 2015 Available from: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P7-TA-2014-0212+0+DOC+XML+V0//EN.

226. Banisar D, Davies SG, Marshall J. Global Trends in Privacy Protection: An International Survey of Privacy, Data Protection, and Surveillance Laws and Developments. Journal of Computer & Information Law, Vol. XVIII; 1999.

227. Khosrowpour M. Emerging Trends and Challenges in Information Technology Management. Washington, DC: 2006 Information Resources Management Association International Conference; 2006.

228. Statista. Development of Internet Crime in Germany.

[Internet]. 2015 Available from: http://de.statista.com/statistik/daten/studie/295265/umfrage/polizeilich-erfasste-faelle-von-cyberkriminalitaet-im-engeren-sinne-in-deutschland/.

229. communities CotE. Communication from the commission. [Internet]. 2006 [cited 2015 Mar 4]. Available from: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52006DC0614.

230. Commission E. EU policy in the field of adult learning. [Internet]. 2015 [cited 2015 Mar 4]. Available from: http://ec.europa.eu/education/policy/adult-learning/index_en.htm.

231. The Education AaCEA. Lifelong Learning Programme. [Internet]. 2014 [cited 2015 Mar 4]. Available from: http://eacea.ec.europa.eu/llp/.

232. Department of Education and Science D(. Learning for Life: White Paper on Adult Education. [Internet]. 2000 [cited 2015 Mar 4]. Available from: http://files.eric.ed.gov/fulltext/ED471201.pdf.

233. Domik G, Gerhard F. Transdisciplinary Collaboration and Lifelong Learning: Fostering and Supporting New Learning Opportunities. [Internet]. 2011 [cited 2015 Mar 4]. Available from: http://l3d.cs.colorado.edu/~gerhard/papers/2011/maurer-book.pdf.

234. Secretariat BLCfEPaRP. Strategy for Lifelong Learning in the Federal Republic of Germany. [Internet]. 2004 [cited 2015 Mar 4]. Available from: http://www.blk-bonn.de/papers/volume115-english.pdf.

235. Development SoVDoEaEC. Developing, monitoring and reporting on personal learning goals. [Internet]. 2006 [cited 2015 Mar 5]. Available from: http://www.education.vic.gov.au/Documents/school/teachers/teachingresources/social/personal/devperslearngoal.pdf.

236. Blaschke LM. Heutagogy and Lifelong Learning: A Review of Heutagogical Practice and Self-Determined Learning. [Internet]. 2012 [cited 2015 Mar 4]. Available from: http://www.irrodl.org/index.php/irrodl/article/view/1076/2087.

237. Brody R. Holding High Expectations for All Students. [Internet]. 2014 [cited 2015 Mar 4]. Available from: https://www.teachforamerica.org/blog/holding-high-expectations-all-students.

238. Tremblay JF, Coulombe S. Literacy Scores, Human Capital and Growth. [Internet]. 2004 [cited 2015 Mar 5]. Available from: ttp://aix1.uottawa.ca/~scoulomb/pages/Coulombe-Tremblay-UOWP0407E.pdf.

239. EENEE EENoEoE. Financing lifelong learning: Funding mechanisms in education and training. [Internet]. 2011 [cited 2015 Mar 5]. Available from: www.eenee.de/dms/EENEE/Analytical_Reports/EENEE_AR10.pdf.

240. IRS. Tax Benefits for Education: Information Center. [Internet]. 2015 [cited 2015 Mar 8]. Available from: http://www.irs.gov/uac/Tax-Benefits-for-Education:-Information-Center.

241. Research ICfHE. U.S. Enrollment Data. [Internet]. 2014 [cited 2015 Mar 8]. Available from: http://www.icher.org/endata.html.

242. AWSNA AoWSoNA. Spreading the Promise of Waldorf Education throughout North America. [Internet]. 2013 [cited 2015 Mar 8]. Available from: http://www.whywaldorfworks.org/04_AWSNA/documents/asn_annualrep2013_FNL_lowres.pdf.

243. GOV.UK. Grants and bursaries for adult learners. [Internet]. 2014 [cited 2015 Mar 8]. Available from: https://www.gov.uk/grant-bursary-adult-learners.

244. Education USDo. Adult Education - Basic Grants to States. [Internet]. 2014 [cited 2015 Mar 8]. Available from: http://www2.ed.gov/programs/adultedbasic/index.html.

245. EUCEN EUCEN. Current Projects. [Internet]. 2015 [cited 2015 Mar 8]. Available from: http://www.eucen.eu/currentprojects.

246. Harvard University DfCE. Extending Harvard's excellence to students at every stage of learning. [Internet]. 2015 [cited 2015 Mar 8]. Available from: http://www.dce.harvard.edu/.

247. Brinkley I, Fauth R, Mahdon M, Theodoropoulou S. The Work Foundation. [Internet]. 2009 [cited 2015 Mar 8]. Available from: http://www.theworkfoundation.com/DownloadPublication/Report/213_213_know_work_survey170309.pdf.

248. Education NRC(Cf. Research on Future Skill Demands: A Workshop Summary. [Internet]. 2008 [cited 2015 Mar 8]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK4074/.

249. Waters LH, Barbour MK, Menchaca MP. The Nature of Online Charter Schools: Evolution and Emerging Concerns. [Internet]. 2014 [cited 2015 Mar 8]. Available from: http://www.ifets.info/journals/17_4/26.pdf.

250. Assmann J. The Mind of Egypt: History and Meaning in the Time of the Pharaohs. 2002.

251. Tyack DB. The One Best System: A History of American Urban Education. Boston: Harvard College; 1974.

252. Bundesdirektoren Konferenz. Düsseldorfer Erklärung. [Internet]. 2015 Available from: http://www.bdk-gymnasien.de/entschliessungen-pressemitteilungen/duesseldorfer-erklaerung.html.

253. International Baccalaureate. About the IB's programmes. [Internet]. 2015 Available from: http://www.ibo.org/.

254. Erasmus+. About Erasmus+. [Internet]. 2015 Available from: https://erasmusplus.org.uk/about-erasmus.

255. Bundesministerium für Bildung und Forschung. Der Bologna-Prozess - die Europäische Studienreform. [Internet]. 2015 Available from: http://www.bmbf.de/de/3336.php.

256. Westlaw. European Law Review. 2014. Available from: file:///C:/Users/Isabel/Downloads/NECEConferencepaper_REVISEDVERSION_20140127_web.pdf.

257. Europäische Kommission. Erasmus+. [Internet]. 2015 Available from: http://ec.europa.eu/programmes/erasmus-plus/index_de.htm.

258. Education World, Inc. Curriculum: National and state standards. [Internet]. 2015 Available from: http://www.educationworld.com/standards/.

259. Stanford University. How the Finnish school system outshines the U.S. education. [Internet]. 2015 Available from: http://news.stanford.edu/news/2012/january/finnish-schools-reform-012012.html.

260. qLearning. qLearning Press Kit - Factsheet. [Internet]. 2015 Available from: https://www.qlearning.de/de/about.

261. Deloitte University Press. MOOCs teach corporations about new opportunities. [Internet]. 2013 Available from: http://deloitte.wsj.com/cfo/files/2014/03/MOOC_

report.pdf.

262. Rivard R. The Fine Print. [Internet]. 2013 Available from: https://www.insidehighered.com/news/2013/05/28/documents-shed-light-details-georgia-tech-udacity-deal.

263. Zillman Z. Coursera teams up with Instagram, Google: The search for a business model. [Internet]. 2015 Available from: http://fortune.com/2015/02/11/coursera-google-instagram/.

264. Radford AW,RJ,CS,HL,TJ,&WK. The employer potential of MOOCs: A survey of human resource professionals' thinking on MOOCs. [Internet]. 2014 Available from: http://www.rti.org/pubs/duke_handbook-final-03252014.pdf.

265. Udacity-Blog. Udacity's Career Team is here to help you. [Internet]. 2012 Available from: http://blog.udacity.com/2012/06/udacity-career-placement-program-is.html.

266. Jones-Bey L. Coursera and your career. [Internet]. 2012 Available from: http://blog.coursera.org/post/37200369286/coursera-and-your-career.

267. Economist T. The attack of the MOOCs. [Internet]. 2013 Available from: http://www.economist.com/news/business/21582001-army-new-online-courses-scaring-wits-out-traditionaluniversities-can-they.

268. Vaccaro A. What Recruiters Need to Know About EdTech – and the Expanding Talent Pool.. [Internet]. 2014 Available from: http://www.inc.com/adam-vaccaro/edtech-recruiting.html.

269. Eggers WD,HIJ,&DUP. Brawn from brains – Talent, policy and the future of American competitiveness. [Internet]. 2012 Available from: http://d2mtr37y39tpbu.cloudfront.net/wp-content/uploads/2012/09/DUP178_TALENT1.pdf.

270. Sledge L,FTD,&DUP. Reimagining higher education. How colleges, universities, businesses, and governments can prepare for a new age of lifelong learning. [Internet]. 2014 Available from: http://d2mtr37y39tpbu.cloudfront.net/wp-content/uploads/2014/05/DUP_758_ReimaginingHigherEducation.pdf.

271. IBIS Capital. Global e-Learning Investment Review. 2013.

272. Albuquerque P, Pavlidis , Chatow U, Chen KY, Jamal Z, Koh KW. Evaluating Promotional Activities in an Online Two-Sided Market of User-Generated Content. Marketing Science 31(3). 2012:406-432.

273. Yuan , Powell S. JISC cetis – centre for educational technology & interoperability standards. MOOCs and Open Education: Implications for Higher Education. 2013.

274. Empson R, Ferenstein G. Techcrunch. [Internet]. 2013 [cited 2015 Mar 9]. Available from: http://techcrunch.com/2013/09/12/free-massive-online-education-provider-coursera-begins-to-find-a-path-to-profits/.

275. CrunchBase. Udemy company profile. [Internet]. 2015 [cited 2015 Mar 09]. Available from: https://www.crunchbase.com/organization/udemy.

276. Hyder S. Forbes. [Internet]. 2014 [cited 2015 Mar 09]. Available from: http://www.forbes.com/sites/shamahyder/2014/12/29/12-companies-transforming-education-to-watch-next-year/.

277. Kumar R. Wiredacademic. [Internet]. 2012 [cited 2015 Mar 9]. Available from: http://www.wiredacademic.com/2012/03/opinion-online-tutoring-disrupting-traditional-tutor-model-but-expanding-the-tutor-industry/.

278. Crotty JM. Forbes. [Internet]. 2012 [cited 2015 Mar 9]. Available from: http://www.forbes.com/sites/jamesmarshallcrotty/2012/10/30/global-private-tutoring-market-will-surpass-102-billion-by-2018/.

279. Global Industry Analysts, Inc. Private Tutoring – A Global Strategic Business Report. [Internet]. 2014 [cited 2015 Mar 9]. Available from: http://www.strategyr.com/press-MCP-1597.asp.

280. Kaner C. The "Failure" of Udacity. [Internet]. 2013 [cited 2015 Mar 9]. Available from: http://kaner.com/?p=367.

281. Ernst & Young. University of the future. A thousand year old industry on the cusp of profound change.. Australia 2012.

282. Giving USA Foundation. Giving USA Foundation. [Internet]. 2014 [cited 2015 March 08]. Available from: http://givingusa.org/giving-usa-2014-implications-for-higher-education/.

283. Foster WL. 10 Ten Nonprofit Funding Models. Stanford Social Innovation Review. 2009 32-39.

284. Arillaga-Andreessen L. Disruption for Good. Stanford Social Innovation Review. 2015 34-39.

285. Powell S. MOOCs and Open Education: Implications for Higher Education. JISC cetis – centre for educational technology & interoperability standards; 2013.

286. Afuah A. Business Model Innovation: Concepts, Analysis, and Cases. New York: Routledge; 2014.

287. Hewlett Foundation. The Nonprofit marketplace: Bridging the Information Gap in Philanthropy. [Internet]. 2008 [cited 2015 March 08]. Available from: http://www.hewlett.org/uploads/files/whitepaper.pdf.

288. Hess FM,HMB. Private Enterprise and Public Education. New York: Teachers College Press; 2013.

289. Sultan N. Cloud computing for education: A new dawn? International Journal of Information Management. 2010:109-116.

290. Capital I. Global e-Learning Investment Review [Internet]. 2013 Jan.

291. MarketsandMarkets. Learning Management Systems (LMS) Market - Worldwide Market Forecasts and Analysis 2013 - 2018. [Internet]. 2013 Available from: http://www.marketsandmarkets.com/Market-Reports/learning-management-systems-market-1266.html.

292. Crunchbase. 2U Company Profile. [Internet]. 2014 Available from: https://www.crunchbase.com/organization/2u.

293. Farr C. Newly profitable Knewton raises $51M for personalized learning. [Internet]. 2013 Available from: http://venturebeat.com/2013/12/20/newly-profitable-knewton-raises-51m-for-personalized-learning/.

294. Hackmann F. Holtzbrinck Digital and RI Digital Ventures invest Series A in e-learning platform Patience. [Internet]. 2014 Available from: http://venturevillage.eu/series-a-for-e-learning-platform-patience.

295. Kaltura. Kaltura Raises $47 Million on the Heels of Massive Growth. [Internet]. 2014 Available from: http://corp.kaltura.com/company/news/press-release/kaltura-raises-47-million-heels-massive-growth.

296. docebo. E-Learning market trends & forecast 2014-2016 Report [Internet]. 2014.

297. Markku Sääksjärvi AL,HN. Evaluating the software as a service business model: From CPU time-sharing to online innovation sharing. Proceedings of the IADIS International Conference e-Society. 2005:177-186.

298. Etherington D. Apple Has Sold Over 8M iPads Direct To Education Worldwide, With More Than 1B iTunes U Downloads. [Internet]. 2013 Available from: http://techcrunch.com/2013/02/28/apple-has-sold-over-8m-ipads-direct-to-education-worldwide-with-more-than-1b-itunes-u-downloads/.

299. Finanzen Bd. AfA-Tabelle für die allgemein verwendbaren Anlagegüter [Internet]. 2000 Dec.

300. Bayerisches Staatsministerium für Bildung und Kultus WuK. Bekanntmachung über erläuternde Hinweise zum Vollzug der datenschutzrechtlichen Bestimmungen für die Schulen. II. Bekanntmachungen der Bayerischen Staatsministerien für Unterricht und Kultus und Wissenschaft, Forschung und Kunst. 2013 Jan 11.

301. Grams PDT. Oberflächenkompetenz und Konsumverhalten: Trends im Bildungswesen – eine kritische Betrachtung. THEMA Hochschule Fulda. 2008 Feb:4-6.

302. Duolingo. Duolingo. [Internet]. [cited 2015 March 4]. Available from: www.duolingo.com.

303. UC-Crowd. UC-Crowd. [Internet]. [cited 2015 March 4].

304. qLearning. qLearning. [Internet]. [cited 2015 March 9]. Available from: www.qlearning.de.

305. CrunchBase. Duolingo Company Profile. [Internet]. [cited 2015 March 8]. Available from: www.crunchbase.com/organization/duolingo.

306. Simonite T. The Cleverest Business Model in Online Education. [Internet]. 2012 [cited 2015 March 8].

307. Gemeinsamer Europäischer Referenzrahmen für Sprachen. [Internet]. [cited 2015 April 2]. Available from: http://www.europaeischer-referenzrahmen.de/.

308. UNWTO. UN World Tourism Organization. [Internet]. 2013 [cited 2015 May 05]. Available from: http://media.unwto.org/en/press-release/2013-01-28/international-tourism-continue-robust-growth-2013.

309. Entwicklung des Tourismus. [Internet]. [cited 2015 April 2]. Available from: http://www.bmwi.de/DE/Themen/Tourismus/entwicklung-des-tourismus.html.

310. Minotti M. Virtual reality market growing? One store has 150K downloads for VR games. [Internet]. 2015 [cited 2015 April 4]. Available from: http://venturebeat.com/2015/01/19/virtual-reality-market-growing-one-store-has-150k-downloads-for-vr-games/.

311. Lang B. WEARVR Raises $1.5 Million for Universal VR App Marketplace. [Internet]. 2015 [cited 2015 April 7]. Available from: http://www.roadtovr.com/wearvr-raises-1-5-million-for-universal-vr-app-marketplace/.

312. Constine J. The "Oculus Platform" Marketplace For Virtual Reality App Launches This Fall. [Internet]. 2014 [cited 2015 April 4]. Available from: http://techcrunch.com/2014/09/20/oculus-platform/.

313. HOELZEL M. There's A Simple Rule That's Helping Marketers Advertise More Effectively On Social Networks. [Internet]. 2014 [cited 2015 April 4]. Available from: http://www.businessinsider.com/brands-for-social-media-advertising-2014-10.

314. The Trade Fair Market. [Internet]. [cited 2015 April 4]. Available from: http://www.auma.de/en/tradefairmarket/seiten/default.aspx.

315. Augmented World Expo. [Internet]. [cited 2015 April 4]. Available from: http://augmentedworldexpo.com/.

316. McLeod S. Bandura - Social Learning Theory. [Internet]. 2011 [cited 2015 April 7]. Available from: http://www.simplypsychology.org/bandura.html.

317. creativityinstitute, Childhood Development. creativityinstitute.com. [Internet]. 2015 Available from: http://www.creativityinstitute.com/earlychildhooddevelopment-childrenandtoys.aspx.

318. naeyc, Gender Typed Toys. naeyc.com. [Internet]. 2015 Available from: http://www.naeyc.org/content/what-research-says-gender-typed-toys.

319. Statista, Purchase Criteria. Purchase Criteria 2014. [Internet]. 2014 Available from: http://de.statista.com/statistik/daten/studie/206920/umfrage/kaufkriterien-bei-spielzeug/.

320. Statista, Where toys are purchased. Where toys are purchased 2014. [Internet]. 2014 Available from: http://de.statista.com.eaccess.ub.tum.de/statistik/daten/studie/171501/umfrage/kauforte-fuer-spielzeug/.

321. Statista, Trust in Toys. Trust in Toys 2014. [Internet]. 2014 Available from: http://de.statista.com/statistik/daten/studie/375645/umfrage/umfrage-zum-vertrauen-der-deutschen-in-ein-spielzeug/.

322. TÜV Rheinland. [Internet]. 2015 Available from: http://www.tuv.com/de/deutschland/gk/produktpruefung/kinder_spielzeug/spielzeug/spielzeug.html.

323. Preißler PR, Dörrie U. Grundlagen Kosten- und Leistungsrechnung: Intensivkurs Betriebswirtschaftslehre. München: Oldenbourg Wissenschaftsverlag; 2004.

324. Clement R, Schreiber D. Internet-Ökonomie: Grundlagen und Fallbeispiele der vernetzten Wirtschaft. Berlin Heidelberg: Springer Verlag; 2010.

325. Stocker F. Spaß mit Mikro: Einfürhung in die Mikroökonomik. München, Wien: Stocker, Ferry; 2002.

326. Pigneur Y, Osterwalder A. Business Model Generation. New Jersey: John Wiley & Sons Inc; 2010.

327. Steinfeld L, Archuleta KS. Educause. [Internet]. 2015 Available from: http://www.educause.edu/ero/article/privacy-protection-and-compliance-higher-education-role-cpo.

328. Commission E. EU policy in the field of adult learning. [Internet]. 2015 [cited 2015 Mar 4]. Available from: http://ec.europa.eu/education/policy/adult-learning/index_en.htm.

329. Beaton AE. http://unesdoc.unesco.org/images/0011/001176/117629e.pdf. [Internet]. 1999 [cited 2015 March 04]. Available from: http://unesdoc.unesco.org/images/0011/001176/117629e.pdf.

330. European Association for Quality Assurance. Standards and Guidelines for Quality Assurance in the European Higher Education Area. 2009. Available from: http://www.enqa.eu/wp-content/uploads/2013/06/ESG_3e-dition-2.pdf.

331. Zentrum für internationale Bildungsvergleichsstudien. Schulleistungsuntersuchungen. [Internet]. 2015 Available from: http://zib.education/startseite.html.

332. Queens College and the Graduate Center of the City University of New York. Research on Globaliza-

tion and Education. [Internet]. 2015 Available from: http://202.116.42.39/kcyjxl/jxtj/pdf/2/3.Research%20on%20Globalization%20and%20Education.pdf.

333. U.S. Department of Education. No Child Left Behind. [Internet]. 2015 Available from: http://www2.ed.gov/nclb/landing.jhtml?src=ft.

334. Educational Testing Service. National Education Standards. 2009. Available from: http://www.ets.org/Media/Research/pdf/PICNATEDSTAND.pdf.

335. Kultusminister Konferenz. Lehrplan - Datenbank. [Internet]. 2015 Available from: http://www.kmk.org/dokumentation/lehrplaene/lehrplan-datenbank.html.

336. Stifterverband für die deutsche Wissenschaft. Hochschulen im Wandel. [Internet]. 2015 Available from: http://www.stifterverband.info/publikationen_und_podcasts/resuemee/wandel_gestalten/hochschulen_im_wandel/index.html.

337. Corporation for Public Broadcasting. Formal vs. Informal Education. [Internet]. 2015 Available from: http://enhancinged.wgbh.org/started/what/formal.html.

338. FBI ICCC. FBI Internet Crime Complaint Center Annual Report 2013. [Internet]. 2015 Available from: http://www.ic3.gov/media/annualreport/2013_IC3Report.pdf.

339. University of York. Data Protection Act. [Internet]. 2015 Available from: http://www.york.ac.uk/admin/hr/resources/policy/dpa_1998.htm.

340. ICDPPC. 34th International Conference of Data Protection and Privacy Commissioners (Uruguay, 2012). [Internet]. 2015 Available from: http://www.garanteprivacy.it/documents/10160/2150357/Resolution+on+the+Future+of+Privacy.pdf.

341. Stanford Center for Opportunity Policy in Education. The Secret to Finland's Success: Educating Teachers. 2010. Available from: https://edpolicy.stanford.edu/sites/default/files/publications/secret-finland%E2%80%99s-success-educating-teachers.pdf.

342. Center for the Economics of Education - London School of Economics. Education Policy in the UK. 2006. Available from: http://cee.lse.ac.uk/ceedps/ceedp57.pdf.

343. Education World, Inc. U.S. Education Standards. [Internet]. 2015 Available from: http://www.educationworld.com/standards/national/.

344. Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the States in the Federal Republic of Germany. The Education System in the Federal Republic of Germany. 2011. Available from: http://www.kmk.org/fileadmin/doc/Dokumentation/Bildungswesen_en_pdfs/dossier_en_ebook.pdf.

345. Skills Funding Agency England. Apprenticeships - Breakdown by geography, equality & diversity and sector subject area: starts 2002/03 to 2014/15. [Internet]. 2015 [cited 2015 March 07]. Available from: https://www.gov.uk/government/statistical-data-sets/fe-data-library-apprenticeships.

346. Stanford University Press. No Exit: Public Education as an Inescapable Public Good. [Internet]. 2000 [cited 2015 Mar 18]. Available from: https://web.stanford.edu/~dlabaree/publications/No_Exit_chapter_from_Cuban_and_Shipps.pdf.

The Future of Education

Education is undergoing radical changes. While education used to be mainly frontally held lectures, digital technologies today allow for a wide range of new possibilities. This not only affects education in schools or universities, but also executive education and trainings – lifelong learning is crucial in today's business world.

With the possibility for everyone to select from a wide range of pre-selected online lectures, teachers are increasingly taking on the role of coaches rather than the one of traditional lecturers. Ted Talks, MOOCs with thousands of enrolled students as well as online tutoring platforms radically change the way education is taking place. In addition, people previously excluded from high-class education (be it people in third world countries but also, on a national level, people from different social backgrounds) can now benefit from online lectures and get access to the same resources.

This report consists of three parts. First, the authors analyze trends in the field of education. Building upon these findings, four scenarios are described, vividly depicting possible futures. In the final Ideation part five educational or business concepts are elaborated and tested against the scenarios.

The developed concepts range from a teaching concept that fosters the entrepreneurial spirit of students and society, an online platform for schools to foster offline time and enhance the motivation to learn, virtual scenarios using Oculus Rift for language learning, a toy for kids to learn by teaching their toy, to a service improving lecture quality by measuring audience attention and offering feedback and coaching.

CDTM

The Center for Digital Technology and Management (CDTM) is a joint interdisciplinary institution of education, research, and entrepreneurship of the Ludwig-Maximilians-Universität München (LMU) and the Technische Universität München (TUM).

Building on the strengths of two of the most prestigious universities in Germany, CDTM provides highly qualified and ambitious students with an excellent academic education in the field of emerging digital technologies. As a research institution, CDTM closely cooperates with the industry, concentrating on Telecommunication, Information Technology, Media, Entertainment, Health and Energy sectors.

E-mail info@cdtm.de
Internet http://www.cdtm.de

Veronika Gamper • Stefan Nothelfer (Eds.)

9 783981 553871