UNIVERSITY OF ZAGREB
FACULTY OF GRAPHIC ARTS

MARKO SKENDEROVIC

DESIGN OF AN EFFICIENT E-LEARNING
USER EXPERIENCE AND INTERFACE

MASTER THESIS

Zagreb, 2015
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Mentor: prof. dr. sc. Lidija Mandić
Student: Marko Skenderović

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ABSTRACT

Although in the last couple of years term “e-learning” became very popular in the virtual world, many people are still unaware of the full capabilities and how it can support them to be more successful in both their professional and personal lives.

E-learning today is increasingly used in practical application. Apart from the everyday use of multimedia and the Internet in the context of formal education, today e-learning enables the organisation of conferences, as well as the so-called e-learning academies, various commercial courses even online education for employees. This thesis focuses on the aspect of e-learning in order to improve the user experience and the learning process using interactive graphic elements, animation, video clips and sound which enforce the main aspects of user experience which are usability, desirability, adoptability and value. Today's era of modern technology and globalization brings rapid change in all aspects of human (personal and professional) life. Their is a need for faster, more timely information, which will also be didactically prepared with appealing design, so that on one side it increases productivity and learning time, but on the other decreases additional costs that would be present with conventional methods of learning. What are the emerging learning trends: a look into themes such as micro-learning and gamification. How important are really audiovisual elements, clean layout, readability, colors, graphics, etc...?

As main examples that follow up the theoretical part I will concentrate on the current field of profession which is e-learning with the focal point on language learning. What are findings from this field and how did I connect the theory of user experience and implement it with the creation of an efficient e-learning experience and interface in Festo.

KEY WORD
E-learning, User Experience, Usability, Focus groups
SAŽETAK

Elektroničko učenje (e-učenje ili engl. e-learning) danas sve češće susrećemo u praktičnoj primjeni. Osim osnovne upotrebe multimediije i interneta u sklopu svakodnevnog formalnog obrazovanja, danas se putem sustava e-učenja omogućava i organizacija konferencija, kao i tzv. E-learning akademije, različitih komercijalnih tečajeva te online obrazovanja zaposlenika. U ovom diplomskom radu pozornost je usmjerena na aspekt e-učenja s ciljem poboljšanja korisničkog iskustva i procesa učenja pomoću interaktivnih grafičkih elemenata, animacije, video isječaka te zvuka te korelacije tih elemenata sa glavnim aspektima korisničkog iskustva: upotrebljivost, poželjnost, prihvaljiljost i vrijednost. Današnje doba modernih tehnologija i globalizacije donosi brze promjene u svim aspektima ljudskog (osobnog i profesionalnog) život. Javlja se potreba za bržim, pravovremenijim informacijama, koje će imati visoku didaktičku funkciju kao i privlačan dizajn, tako da se s jedne strane povećava produktivnost i vrijeme učenja, a s druge smanjuju dodatni troškovi koji bi bili prisutni sa konvencionalnim metodama učenja. Trendovi u e-učenju: su danas mikro-učenje i gamification. Koliko su uistinu bitni audiovizualni elementi, preglednost, čitljivost, boje, grafika, itd ...?

Glavni primjeri koji prate teorijski dio proizlaze iz trenutnog područja rada: e-učenje s naglaskom na učenje jezika. U ovom radu je prikazana primjena teoriju korisničkog iskustva sa stvaranjem učinkovitog e-learning iskustva i sučelja za Festo.

KLJUČNE RIJEČI

Elektroničko učenje, Korisničko iskustvo, Iskoristivost, Fokus grupe
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1. INTRODUCTION

Although in the last couple of years term “e-learning” became very popular in the virtual world, many people are still unaware of the full capabilities and how it can support them to be more successful in both their professional and personal lives.

E-learning today is increasingly used in practical application. Apart from the everyday use of multimedia and the Internet in the context of formal education, today e-learning enables the organisation of conferences, as well as the so-called e-learning academies, various commercial courses even online education for employees. This thesis focuses on the aspect of e-learning in order to improve the user experience and the learning process using interactive graphic elements, animation, video clips and sound which enforce the main aspects of user experience which are usability, desirability, adoptability and value. Today's era of modern technology and globalization brings rapid change in all aspects of human (personal and professional) life. Their is a need for faster, more timely information, which will also be didactically prepared with appealing design, so that on one side it increases productivity and learning time, but on the other decreases additional costs that would be present with conventional methods of learning. What are the emerging learning trends: a look into themes such as micro-learning and gamification. How important are really audiovisual elements, clean layout, readability, colors, graphics, etc...?

As main examples that follow up the theoretical part came out of current field of profession which is e-learning with the focal point on language learning. In this master thesis the connection of the theory of user experience and its implementation in the creation of an efficient e-learning experience and interface in Festo is presented.
2. THEORETICAL PART

2.1. E-learning and historical overview

2.1.1. What is E-learning?

When it comes to education, for decades we have used the same model of learning. For this purpose, we can call this the classical learning model. This pattern of learning demands physical presence of the tutor and the students. The teacher’s role is to lead the learning process and to presents his skills and knowledge in the most efficient and advisable way. Furthermore, the better approach the tutor has, the better he will motivate his students. Then the computer evolution occurred and it tremendously shifted the landscape of learning. Slowly but surely a new term known as e-learning came to the scene. What is it? E-learning is a computer based educational tool or platforms that provides the ability for users to learn at any desired location at time of their choice. It is mostly developed and delivered through the channels of Internet, even though previously it was distributed using a variety of computer-based methods. Technology has progressively advanced and enabled that the geographical gap is bridged with the use of platforms that provide a sense of feeling as if you are immersed in the classroom environment. E-learning offers a unique capability to information sharing in various formats such as audio, videos, slides, text documents and PDFs [1]. Organising and overseeing webinars (live online classes) and having an ability to communicate with professors via chat and message forums is also an option that is enabled for users. There is an excessive amount of divergent e-learning systems (commonly known as Learning Management Systems) and methods, which enable easier lesson deliverability. With the right tool numerous processes can be automated such as the marking of tests or the creation of engaging content. E-learning enables and provides the clients with the ability to fit learning around their lifestyles, effectively providing the opportunity to everyone to learn new qualifications and skills(Figure1). Some of the most crucial developments in education have happened since the launch of the Internet. These days’ learners are well skilled in the use of smartphones,
text messaging and using the Internet, thus participating in, and running an online course has become a simple task. Social media, message boards, and divergent other means of online communication allow students to keep in touch and discuss course related matters, whilst providing for a sense of community and additional value of engagement. In the fast-paced world of e-learning the accessible technologies to make the lessons engaging are ever changing, and the content can and should be updated promptly to give pupils the latest and newest information. This is essentially important if e-learning content is provided to workers in regions where staying up-to-date on industry innovations is of great importance. Exactly because of this, today, majority of businesses and institutions have implemented e-learning trainings for their employees. Other reasons involve low financial costs and the possibility for workers to study in their own time and place. While, the financial cost of conventional learning methods are more expensive, the preparation is longer and the results are inconsistent, e-learning provides an alternative that is faster, cheaper and quite likely better [2].

Figure 1. Classical classroom and e-learning illustration, Freepik.
2.1.2. A Historical Overview

The term “e-learning” has, popularly, only been in use since 1999, when the word was first applied at a CBT systems seminar. Different phrases also began to show up in search of an authentic description such as “learning online”. It is very important to state that the ideas and thoughts supporting electronic learning methods have been quite well written down throughout the past, and there is even evidence which suggests that early model of e-learning existed as far back as the 19th century. An e-learning timeline was launched long before the Internet, distance courses were being offered to secure students with education on precise lessons or skill sets. Later In the year of 1840 Isaac Pitman taught his students shorthand via correspondence [1]. This model of writing symbols in a certain way was developed to enhance the writing speed and was popular amongst, writers, journalists, secretaries and other people who quite frequently used techniques like note taking or writing. Mr. Pitman, who was a qualified tutor, sent completed tasks by mail and he would then send his pupils more work to be finished using the same system. In the year of 1924, the first testing machine was created and developed, and that device allowed pupils to test themselves. Then, in the year of 1954, BF Skinner, a Harvard Professor, basically created the “teaching machine”, which gave an opportunity to schools to provide programmed courses for their students. Nonetheless only in 1960 the first computer based training program was introduced and later globally popularized. This training program that used the computer, as it's main base platform (or CBT program), was commonly known as PLATO (Programmed Logic for Automated Teaching Operations). It was initially created and developed for students enrolled on the University of Illinois, but ended up being used in education facilities throughout the area. The first e-learning models were only set up to deliver information to students but as we entered the 70s learning through electronic channels and platforms started to become more engaging and interactive. In Britain, the Open University had shown a high level of interest to take advantage of e-learning. Their system of education has always been initially concentrated on distance learning. In the past, course materials were delivered by post and correspondence with teachers was
predominantly via mail. With the Internet the Open University started to provide a wider spectrum of interactive educational experiences as well as faster correspondence with pupils via email etc. Nowadays with the introduction of computer based platforms and Internet technology in the late 20th century, tools that support e-learning are being developed more [4]. The first MAC in the 1980’s allowed for people to posses computers, making it easier for them to learn about certain topics, thus learning and developing new skills and knowledge, or at least expanding them. Then, in the following decade, online learning environments began to truly evolve, with people being able to access a huge amount of assets on the Internet. By the early 90s several education facilities had been set up that provided lessons mostly online, enhancing the potential of the internet and providing better education to people who would have previously been unable to participate in a college course due to geographical or time restraints. Advancements in the field of technology also aided educational institutions to decree the costs of distance educational programs, a cost deduction that would also affect learners – with the main goal to bring education to more people globally. In the 2000’s, businesses began to use e-learning models to provide meaningful trainings to their workers. Entry level and experienced professionals alike now had the chance to improve upon their industry experience and further develop their skill sets [5]. At home certain persons were allowed the access to programs that offered a possibility to get online certifications and give additional value to their lives through expanded knowledge.
2.2. E-learning development, segments and use

2.2.1. Why develop E-Learning?

Numerous organizations and institutions have entered the e-learning playing field because it can be as efficient as traditional training methods at a lower price value. The development of e-learning, often, has higher financial costs than preparing conventional lecture room materials and training the trainers, particularly if modern media or highly interactive methods and techniques are used. Nonetheless, delivery expenditure for e-learning (including costs of web servers and technical support) are substantially lower than those for classroom facilities, instructor time, participants’ travel and job time lost to attend classroom sessions [4]. Furthermore, e-learning reaches a wider target group by engaging learners who are unable or have difficulty attending and participating in conventional classroom trainings because they are:

> scattered across the globe with limited time and/or resources to travel;

> having problems with real-time communication (e.g. language pupils that come from a foreign country or have issues with public speaking).

> unable to attend lectures due to cultural or religious beliefs and obstacles;

> busy with work or family responsibilities because of which they are not able to participate in lectures on specific dates with a fixed schedule;

> live in conflict affected regions and are highly limited in mobility because of security and safety reasons;

E-learning has the capability to provide efficient techniques and methods for learning, such as sessions where a pupil can receive effective and professional feedback. Also, the advantage is combining collaborative actions and exercises
Can e-learning be used for development of different skill sets?

A specific training course might have a focus at various skill sets

> **interpersonal abilities** (e.g. skills such as verbal and non-verbal communication, responsibility, accountability, manners etc.)

> **cognitive abilities**, which can be knowledge and comprehension (e.g. language learning abilities, understanding complex concepts), problem solving techniques and abilities (mental or thinking skills), as well as memory visual and spatial processing

> **psychomotor skills**, acquiring and further developing of physical impressions and movements (e.g. riding a bicycle or out-door activities such as climbing, running, football etc.)

The majority of e-learning lectures are created to develop and further enhance cognitive skills; the cognitive area of the brain is the most suitable for e-learning. Within the cognitive domain, thinking skills may need more interactive e-learning exercises because those skills are learned better by practical manner. Learning in the interpersonal domain can also be addressed in e-learning by using specific methods[2]. For example, interactive role-playing with appropriate feedback can be used to modify they way we behave.

When making the decision between e-learning, face-to-face instruction or other types of informal or on-the-job learning include we should ask ourselves these questions:

> What is the best volume of learning distribution? One big part at the same time or several small parts spread across time?
> What is the average price value of each type of training?

> Does it address a short-term or a long-term demand?

> What are the group’s geo-political circumstances time availability, in terms of learning in a classroom type environment or other forms of concurrent learning methods?

> Do pupils have access to appropriate software and hardware equipment?

> Are pupils motivated enough for e-learning methods?

**E-learning is a good option when:**

> there is a large amount of information and materials to be delivered to a large number of students;

> the learning content should be provided to group in different geographical locations;

> the learning group has confined mobility;

> the learning group can dedicate only a portion of time for ;

> students posses limited knowledge in Internet and computer skills;

> students want to learn at their own place and time regardless of the location;

> more parties need to reuse the learning material in different time slots;

> the purpose of learning is more to develop mental skills vs. physical;

> the teacher needs to track the progress of their learners in the form of data sheets etc.

It is important to state that this type of electronic distance on the go learning is not intended to fully replace learning methods in the classroom or an organisation. Primarily it is intended to support and aid the classical system.
2.2.2. E-Learning types

In the world today when it comes to e-learning there are two main approaches: learning at your own pace and teacher guided learning [3]. Learning at your own pace, is an approach where the learner is autonomous and alone, while guided and teacher-led e-learning lessons enable various layers of support from instructors and teachers and it encourages collaboration between learners for the benefit of reaching the end goal. More than often, e-learning combines both types and blends them together, but for purely classification reasons they are separated.

a) E-learning at your own pace

Pupils that are in their own environments are provided with online learning software, which can be supported, by resources and materials (print) that are a part of the learning content (Figure 2). Depending on the area of learning and the profession the amount of supplementary materials will vary. Software is normally stored on online servers for the purpose of easier online access from the learners side through special platforms, or the materials can even be copied do CD’s and distributed accordingly. Participants have the opportunity to learn at their own pace and are enabled to set their own learning paths according to their interests and needs. Instructors are not obliged to schedule manage or track participants in their learning experience. The content is created depending on the desired or needed learner’s knowledge. It is provided in different media forms such as text, graphics, animations, videos, sounds. The content should explain and support the learning experience as much as possible using infographics, examples, glossaries information boxes, interactive elements, games, drag and drop elements etc. With these elements in mind the whole experience should be much more engaging providing the learners a higher level of motivation. Usually the web.-based learning experience is in need of support in the form of e-mail or tutoring via the Internet, scheduled Skype call’s etc. One thing to keep in mind is that the experience can be offered online or offline, but the online approach has the advantage that user actions and progress can be tracked and later evaluated.
by the instructor. Also the learning experience and content can be adjusted and tailored to each user individually depending on the progress speed and level of proficiency.

Figure 2. Self-paced method, Freepik.

b) E-learning that is guided and facilitated by a teacher

This type has significant differences as it tries to leverage the potential of group learning aided by a trained professional in the form of an instructor, trainer or mentor. In this approach, a continuous educational programme is created that combines various information and actions into lessons that are delivered over time. The lessons are planned and facilitated by a tutor with the help of a platform that is usually online based (Figure 3). For personal study approach learning information and materials are implemented in the lessons of the teacher, as well as personal tasks, overviews, and action that require team collaboration between the participants. The communication between the pupil and teachers can be supported by e-mail, chats, forums document sharing and videoconferences. The idea behind of these communication tools is to make the learning experience more engaging and fun and to provide a better end result in less time. In conclusion the last stage
is to test the newly acquired learners knowledge through a final test where the teacher can see the progression levels and if needed to provide additional trainings for certain individuals.

Figure 3. Teacher-facilitated method, Freepik

2.2.3. E-Learning segments

So far from the information provided earlier, we know that e-learning methods can merge various e-learning elements, and some of the include:

a) e-learning information;

b) mentoring, and training via electronic/internet tools;

c) learning through collaboration;

d) internet/online lecture room.

a) E-learning information

This information can include:
> elementary learning assets

Elementary learning assets are assets that don’t have any interaction elements such as documents, PowerPoint presentations, video material or audio files (Figure 4). These assets are non-interactive which means that pupils are able only to read or watch information without the possibility to do any other activity. These assets can be created fairly fast and, when they are aligned with desired goals and are developed in a systematic manner, they can be a beneficial learning asset even though they don’t enable any interaction elements.

Figure 4. Learning assets, Freepik.

> Courses with interactivity elements

One of the popular methods for internet learning at your own pace is training via internet platforms that are compiled of a group of courses with interactivity elements. An internet course is a order of screens that progresses from one frame to another gradually in a linear fashion which can include text, graphics, animations, audio, video and requires interaction as some elements as quizzes and questions are created in a way with drag and drop, or fill in the line, or selected the correct answer elements (Figure 5). This provides and additional level of engagement and a faster learning curve. Internet courses can also provide suggested various online resources and assets for additional readings and information sources.

Figure 5. Interactivity elements, Freepik.
Simulated real-life environments are methods that induce high levels of interaction of e-learning. The phrase “simulated real-life environments” essentially means that we a learning environment that replicates real-life situations is created so that the students or participants can more easily connect with the learning material and faster and easier learn and enhance their experience with a practical approach learning by doing. Also this type of training software is equipped with highly sophisticated algorithms that track the learning progress of each individual and can adapt to different levels of performance (Figure 6).

> Profession knowledge chunks

Profession knowledge chunks offer on-demand information that is related to a certain profession inquiry. In various groups and be provided through various media (e.g. computer, print, smartphone). They commonly distributed prompt information to concrete inquiries, and with that ensuring that students have an easier way to accomplish their desired goals and objectives. Short definition of technical phrases and inventory of tools and key topics are a few examples of profession knowledge chunks, but also complex professional software can also be created to support and help employees in their daily tasks. All information can be provided in digital or printed form (Figure 7).
b) Mentoring and training via electronic internet tools

In order to enhance the learning experience of students and users it is necessary that the technological learning through internet has support as well in the form of instructors or mentor feedback through various devices or media or in person (Figure 8). The assistance can be provided as a group or individual experience depending on the main objective and course overview of each specific learner.

Figure 8. Mentoring via internet tools, Freepik.

c) Collaborative learning

Actions that require collaboration between team members or individuals can use methods like topic conversations, brainstorming sessions, information sharing in order to reach a shared goal objective faster with more diverse ideas and a higher level of engagement. Also tools that can help and aid the the collaborative learning experience can be video or text chats utilizing the power of facebook or skype, forums, blogs ect.

> Topic conversations and information sharing

Parallel or nonparallel argumented topic conversations are conceptualized to induce discussions and sharing of information and tips between participants. They can comment and exchange ideas and topics about lessons actions and tasks or support and induce the group collaborative learning experience by best practice knowledge sharing (Figure 9).

Figure 9. Collaborative learning, Freepik.
Team collaboration projects means that each person has to work with their team members and share knowledge in order to reach their key objective in the best way possible. These actions are thought of in a way that each project is divided into different segments which and the various task are distributed equally among team members (Figure 10).

![Figure 10. Collaboration tasks, Freepik.](image)

**d) Online lectureroom**

In this type of environment the main principles are the the teacher presents and teaches from a distant location but in real time to a specific group of students with the help of various digital media such as slides, presentations, videos, audio samples and animations (Figure 11). The teaching method is done in a simultaneous way so that the students can learn in real time. This technique is very useful as the preparation of materials is the most easiest, from an instructors point of view. The only thing to keep in mind is that adequate technology has to be used and set up, concretely the internet connectivity and adequate software tools, so that the learning experience is best.

![Figure 11. Online lectureroom, Freepik.](image)
2.2.4. Simultaneous and non-simultaneous online learning

a) Simultaneous

The main premise of simultaneous learning is that it occurs at the same time (Figure 12). In order for two persons to communicate simultaneously it is imperative that they are at the same location at the same time. Some modern day applications of this technique would be video conferencing through skype or similar tools. Also chats or internet messaging, as well as application sharing and webcasting.

![Figure 12. Learning at the same time, Freepik.](image1)

b) Non-simultaneous

The main premise of non-simultaneous activities ist that they are not dependant on time factors (Figure 13). Participants can learn at their own pace and in their own time schedules. On the other ahnd the instructor checks the results and gives feedback in his own time. This technique is mostly used when participants of the same course are spread through out the globe in different time-zones. The main communications goes through channels like e-mail and forums where the topics are posted and answered in different time spans.

Due to the flexibility opportunities of internet technology certain conferences and meetings a can be recorded and shared with participants who are unable to attend for various reasons.

![Figure 13. Learning at different times, Freepik.](image2)
2.2.5. Quality of e-learning

The main premise of the quality levels of e-learning content depend on [8]:

> **learner-focused information:** Learning materials should have the main focus on the needs and main objectives of each specific learner so that the learner experience supports professional growth and specific skills knowledge.

> **level of detail and structure:** Learning courses should be equipped with information that is divided into smaller chunks so as to enable easier course preparation and to induce knowledge sharing.

> **appealing information and presentation:** It is of imperative value for the overall learning experience that the courses are developed in an engaging and fun way so as to captivate the imagination and induce the motivation of each specific learner.

> **levels of interaction:** In today's modern learning world interaction with the content is becoming more and more important as it raises the levels of engagement and support constructive thinking and cognitive problem solving.

> **individual adaptation:** Lectures that offer the ability to learn at your own time should also possess the ability to be adapted to each specific learner in a custom fashion. As learners have different levels of knowledge and potential of learning it is crucial that the content is adapted in different ways to meet the needs of learners.
2.2.6. Examples of e-learning platforms

Now we will have a look into some examples of e-learning that were specifically designed to handle low internet connectivity issues and poor technical requirements of users personal computers.

a) Self-paced courses on language learning with innovative features and technology like community interaction, gamification elements, access to language tutors in 1on1 video conversations, speech recognition, online browser vocabulary implementation, translation of online articles and review amongst peers, and full support for mobile learning.

Free platforms:

Figure 14. Duolingo landing page, duolingo.com [41]

Figure 15. Lingua.ly dashboard, lingua.ly [48]
Learners need to register in order to take the courses and can choose between studying online, downloading the course on their computers or ordering a CD-ROM. Courses consist of interactive lessons including text, images, animations and interactions. Different instructional techniques are used, such as storytelling, case studies, examples, questions and practice with reinforcement feedback. Additional resources include links to online resources, recommended reading, and a glossary (Figure 16). One can access database of learned words and see the follow keep track of the “strength bar” and repeat the words accordingly [41].

Figure 16. Deutsche Welle dashboard. www.dw.com/de
The television series “Jojo Sucht das Glück”[36] from the leading german online information platform “Deutsche Welle” is another prime example of this learning method but using more entertainment and acting to catch the users attention and incentivize their learning process in a slightly different way. At their disposal the user have 5min episodes with B1/B2 level of language difficulty storylines in different viewing modes depending on internet connectivity and latency with optional german subtitles. After each episode the users have interactive “fill in the gap” and “drag and drop” excersises where they can further develop grammar, followed by glossaries, and downloadable audio, video and pdf materials for offline experiences as well (Figure 16). The whole learning/excersise experience lasts around 10-15mins which is approximately the same amount of time needed for one language excersise on Babbel (Figure 17).

Subscription based platforms:

Figure 17. Babbel course selection page. Babbel.com [43]

Figure 18. Busuu community page. Busuu.com
The community interaction option with its video or chat feature is getting more and more popular as it allows users to connect with each other based on the desired level of language and nativeness of the language buddy/tutor (Figure 18). In this way a person can focus more on the correct pronunciation and “live talking” with a native speaker potentially on the other side of the globe [42]. This builds up levels of engagement and motivation and reinforces trust with the platform and ensures a higher user retention value.

b) Online facilitated courses about skill development and knowledge sharing

There are online courses that focus on learning an entire new skillset or developing/enhancing current ones using techniques and tools for knowledge sharing. These courses adopt a facilitated and collaborative approach, using a combination of learning materials and asynchronous collaboration tools. The lectures can be provided via “Moodle”, which is an open-source online platform commonly used for learning purposes on universities and in some companies, or specifically designed websites that follow up to the “Moodle” basic principles. Participants are supposed to accomplish their tasks and objectives within certain deadlines that are organized on a weekly basis. The lessons handle a different set of tools, including the profiles of participants; forums where participants can discuss their results and findings; information charts; communication platforms that support chats (using Skype); podcasts; videos; short e-lessons; and supplementary information materials (e.g. getting started, editing the profile, using discussion forums etc).
Coursera is a for-profit educational technology company that offers massive open online courses (MOOCs). It works with IVY-league universities to make some of their courses available online, and offers them in physics, engineering, humanities, medicine, biology, social sciences, mathematics, business, computer science, and other subjects (Figure 19). Coursera positions itself as learning without limits. All courses offered by Coursera are "accessible for free" and some give the option to pay a fee to join the "Signature Track." Students on the Signature Track receive verified certificate (49€), appropriate for employment purposes (Figure 20). These students authenticate their course submissions by sending webcam photos and having their typing pattern analyzed. Each course includes short video lectures on different topics and assignments to be submitted, usually on a weekly basis [24].

Coursera courses approximate from four to ten weeks long, with one to two hours of video lectures a week. These courses provide quizzes, weekly exercises, peer-
graded assignments, and sometimes a final project or exam. Courses are also provided on-demand in which the user can take his/her time in completing the course with all of the material available at once on demand.

![Coursera certificate](https://www.coursera.com)

Figure 20. Coursera certificate.Coursera.com
Khan Academy is a non-profit educational organization created in 2006 by educator Salman Khan to provide "a free, world-class education for anyone, anywhere". The organization produces micro lectures in the form of YouTube videos. In addition to micro lectures, the organization's website features practice exercises and tools for educators [29]. It received various donations from Google to expand the tech courses, Mexican investors to expand the Spanish course library, and several other investors for similar purposes, which shows the growing demand and popularity of e-learning platforms like this. All resources are available for free to anyone around the world. One of features of the platform is the left-hand menu, where learners can access sessions, activities (e.g. for discussions or to share reflections) and resources and have a historical overview of their activities in a form of a timeline (Figure 21). The main section, in the middle of the page, shows learning activities in chronological order.

Figure 21. Khan academy dashboard page. khanacademy.org
Subscription based platforms: **Lynda.com**

Lynda.com is a global leader in online education offering thousands of video courses in software, creative, and business skills for synchronous and asynchronous learning with the support of teachers in video format with subtitles, a manuscript, a dashboard for history overview and detailed categorization of bite sized lessons with on demand downloadable exercise files and video streaming on desktop and mobile devices. Founded in 1995, the company produces video tutorials taught by industry experts (Figure 22). Members have unlimited access to watch the videos, which are primarily educational. On April 9, 2015, LinkedIn announced its purchase of lynda.com for $1.5 billion which is the fourth-largest deal ever in social media and by far the largest in the e-learning digital word. This merger boost the popularity and need for e-learning [33]. It also helps expand the platform into the schools, businesses and governments for large e-learning initiatives as now people can connect their job profiles and learning experiences for better career opportunities, and that in return helps with user engagement and motivation.

![Figure 22. Lynda landing page. Lynda.com](image-url)
Treehouse.com

Figure 23. 156,000 Students across the globe. Treehouse.com

Treehouse is an online interactive education platform that offers video courses in web, mobile and business development. It’s courses on web development and programming are aimed at beginners looking to start a new career, while its courses in business education and marketing teach students how to start and market a business in the technology industry [30]. Today it has 200,000 students spanning across 190 different countries (Figure 23). This is an asynchronous learning platform with optional virtual classroom/workshop conference team lead instructors followed up by gamification elements in the form of progress badges and points but also using innovative didactic features such as interactive code challenges for knowledge testing, quizzes for rapid information recall, clean design for an easier and faster learning experience, as well as a forum area where students can share ideas and new ways of solving problems. To summarize, they currate a weekly YouTube show which covers the latest programming skills in the tech field with a very humorous touch for easier user engagement and motivation.
2.2.7. Blended learning

This type of learning uses a variety of media, techniques and platforms for training purposes (events, actions, technology modules) for the ultimate goal of optimum training development and creation for distinct target groups. The phrase “blended” hints that electronic formats and media is aiding in a complementary fashion the conventional mentor-led training.

A popular author (Bersin 2005) [8] defined maturity model for online corporate training on the topic of e-learning defines two types of blended learning:

a) Programme flow type where exercises connected to learning are coordinated gradually from one stage to another, and participants have concrete time points by which they should to accomplish the different tasks and objectives; this is not that different from conventional training methods, but some of the actions are carried through via various online platforms and channels.

b) Core-and-spoke type where an extensive program is distributed along with a complementary set of information and helpful materials for the purpose of reinforcing the main learning content. It is important to state that the supplements are non obligatory.

The programme flow type is essentially more adapted and suited for overviewed results and tasks (with a focus on certifications as well), as it allows direct tracking of the learning experience and results. Due to it’s preferences each task can easily be overview and observed by a mentor or teacher. Programmes can be designed to use different approaches but I will focus on one that is predominantly being used more in schools and companies for (vocational) education:

A efficient way to engage students and participants which posses various levels of skills and knowledge is to organize a pre-lecture online activity for introductory purposes. This can unsure a proper classification of talent and provide and easier start of the “Face to Face” course. This online activity can be a task. The lecture
can then gather the results of the task and adjust the F2F course individually to each participant baring in mind skill and knowledge gaps. Some of the benefits of this method in comparison to conventional methods is that it motivates students to prepare themselves better, and enables course actions which are specifically tailored to interests and needs of each student, and has a significant impact on the reduction of lectureroom time which directly implies that the overall costs are lower as well.

For optimization purposes all learning materials and media are adaptable and reusable for later trainings and workshops. Elements such as infographics, and statistics as well as other content can be reused for video or text presentations.

**Why choose blended learning over e-learning, or face-to-face?**

Since various students have uneven learning approaches, techniques and styles and as learners have different levels of engagement and motivation, a blended learning approach can provide and guarantee that both previously described needs are met. The learning experience can be adjusted customelly to different approaches and also induce a more engaging and motivational environment and overall experience [8]. As well there are various advantages for the mentor or teacher – The LMS provides various opportunities from tracking and overview of progress, to instant feedback, testing and quizzing.
Application in the corporate setting

More and more technology and media is being used in corporate environments and exactly because of this the application for blended learning methods is becoming very popular [8]. This learning method enables engaging training processes, and ensure the opportunity to provide easy to understand trainings to a significant amount of learners that are usually spread across the globe. Exactly this wide reach is of great importance to corporations. A blended learning method enables access to training assets and information independent of face-to-face meetings. Learnings have at their disposal various learning channels and media formats which is very good for different learning styles. In this setting the greatest advantage is that both online and offline channels are available this making the whole experience more learner-centric which in the end ensures care of different needs and interests. As learners are independent in terms of knowledge sourcing the focus on face-to-face session isn’t that imperative and users can find needed materials elsewhere which induced the self-paced learning experience and increases the level of knowledge retention. In the blended learning method users and participants are provided with the advantage of the conventional lecture room, along with the flexibility of online learning. One practical example of this application - during my internship in “Festo” together with an agency we developed a 3d animation (Figure 24) of complex processes on the topic of energy efficiency in an automation factory. The training was facilitated by an instructor who explained the theory of the processes but the 3d animation provided much needed visual insights that in the end enhanced the learning experience. Also, the animation was and shared with employees globally so they could reach it on-demand.
The main characteristics of corporate e-learning are:

> Fast-paced: The main criteria for learning inside of a corporation is that the experience has to be on fast-paced as the main capitalistic premise states “time is money”. Learning units have to be provided in small portions with maximum efficiency.

> Career-related: Corporate learning experiences support workers in development of new skills and giving them more chances of career advancement in the company.

> Benefits organization: The main focus of corporate learning is mostly pragmatic so as the organization immediately benefits. Overall if the company wants to evolve and develop in a positive way trainings of their employees is mandatory.

> Return on investment: This mark is very important as the corporations always have to be able to make this calculation and gain positive wins. The thing is that calculations of this nature are difficult and tracking of results takes years so it is for the most part a long term investment.
Application in the educational setting

The key difference for learning in education institutions is that the main focus is on sharing of knowledge and not skill training. In the educational setting the key is to have a global perspective approach of learning in an organic way (e.g. subjects like biology) as on the other hand enterprise learning is mostly concentrated on corporate needs (e.g. new process training). Usually when we hear the phrase education we associate it with theoretical knowledge but that doesn’t necessarily mean that it involves learning of certain skills for work. For instance, essential training in the health service profession is commonly and mixture of practical skills, theory and education [12]. As well a thing to keep in mind is that in schools and universities the the learners vary in age and ability to learn, so that means that the learning experiences and technology has to be applied accordingly, which is a huge challenge for designers and didactic professionals. The language learning platform “Duolingo” was able to implement their software in elementary schools across the US as their application has a lot of gamification elements and graphics supported with sound that are very suitable for children age 6-14. Many teachers and entire governments around the world already consider Duolingo as an ideal blended learning supplementary platform for their, as they state already, 100,000 classrooms.

Duolingo lessons give each student personalized feedback and practice, preparing them to get the most out of classroom instruction.

Now teachers can track all their students in one place through the customelly designed dashboard and student account. Duolingo support them with lesson plans which was scientifically tested. They recommend assigning homework in a form of one Duolingo “skill” per week ( a skill like “Plurals” or “Adjectives” ), and encourage students to learn and practice at their own pace, but awarding hem with extra points for higher experience points and reaching milestones.
Merging the two settings

Educational learning participants have the ability to learn from corporate e-learning activities and the other way around, and at the moment there is a trend of merging of both aspects into one unity. For instance, The academic environment has realized the potential of learning practical skill and incorporating them as lessons in academic curriculum and in that way students are learning more concrete topics that they can use at their future work environments. The focus is primarily on how to combine modern technology from the corporate aspect and theory from the educational setting. There are areas of distinct correlation and overlap: learning on the go with the support of mobile devices is becoming more and more used and they are a main part of every day academic and corporate lives. Students and workers have open access to modern internet technologies and platforms in the sense of social media, which can provide content creation, communication and knowledge sharing environments which organically supports blended learning. At the moment academia and enterprises alike are trying to maximize this situation for learning, and to optimize the learning experience. Key questions are, what is the proper use for learning? How does Information design, tutoring theories and methodologies, support the distribution of mobile enabled content.

It is best to say that convergence is possible in smaller segments but not universally, for instance in language learning the process has reached a proficient level of execution but only for ages 18-55, which is by itself a huge success as a certain number of people do have the ability to learn asynchronous on the go, bite sized lessons, with video speech recognition lessons ect... for ages 0-18 the creation process is multilayered and extremely complex, but the formula is here, and companies like Duolingo managed to converge the two worlds, but for different fields it will take more time.
Udacity (Figure 25) is a for-profit educational organization founded by Sebastian Thrun, David Stavens, and Mike Sokolsky offering massive open online courses (MOOCs). According to Thrun, the origin of the name Udacity comes from the company’s desire to be “audacious for you, the student”. While it originally focused on offering university-style courses, it now focuses more on vocational courses for professionals [26]. It was born out of a Stanford University experiment in which the founders offered their “Introduction to Artificial Intelligence” course online to anyone, for free. Over 160,000 students in more than 190 countries enrolled and not much later, Udacity was born. Now they have a growing team of educators and engineers on a mission to change the future of education by bridging the gap between real-world skills, relevant education, and employment. Each course consists of several units comprising video lectures with closed captioning, in conjunction with integrated quizzes to help students
understand concepts and reinforce ideas, as well as follow-up homework which promotes a "learn by doing" model. This platform is used by Google and Facebook (amongst others) for vocational trainings of their employees and interns which only suggests how important it is that e-learning platforms like this exist and how the global e-learning initiative is shifting towards web-based e-learning. The courses are written by these companies and they use the platforms as an LMS system.

![Udacity Course](image)

**Figure 26. Udacity most popular course. Udacity.com**

One of their most popular courses is “How To Build a Startup” (Figure 26). It is taught by Steve Blank who is a seasoned Silicon Valley entrepreneur who succeeded, in a 21-year career building 8 Valley startups, including several with major IPO’s. Along the way, he’s learned an incredible amount, and has spent the last decade sharing what he’s learned with entrepreneurs all over the world. Author of two famous books on entrepreneurship, and an entrepreneurship lecturer at Stanford, Berkeley and Columbia. The main idea in this course is learning how to rapidly develop and test ideas by gathering massive amounts of customer and marketplace feedback. Many startups fail by not validating their ideas early on with real-life customers. In order to mitigate that, students will learn how to get out of the building and search for the right pain points and correct needs of customers. Only with those can the entrepreneur find a proper solution and establish a sustainable business model.

This course is a perfect example that shows how e-learning can provide very important and useful information even free of charge.
2.3. User Experience and historical overview

2.3.1. What is User Experience?

User Experience (UX) includes an individual's emotions and behavior in regards to using a specific product, system or service.

It involves the characteristics of practicality, effectiveness, experience, meaning and value in correlation to the interaction between a human and computer. Furthermore, it describes what is the level of efficiency, ease of use and utility for the user. User Experience is has partially a subjective nature as each user has a different opinion of the experience coming from a technology appliance. The evolutionary nature of it is dynamic and flexible as it is regularly altered over time as a result of changing usage in system specifications and situational usability.

In terms of international standardization on ergonomics of human computer interaction, ISO 9241-210, it is defined that user experience is "a individual's impression and reaction that result from the use and usability of a product, system or service" [3]. According to the ISO standard, user experience involves all the users' emotions, beliefs, desires, impressions, physical and cognitive reactions, nature and achievements that happen before, during and after use. The ISO also states three key elements that have a significant impact on user experience: system, user and the context of use. Note 3 of the definition states that usability addresses characteristics of user experience, e.g. "usability criteria can be applied to assess aspects of overall experience levels" [4]. The definition does not go deeply in clarification of the connection between user experience and usability. Obviously, the two are concepts have similar characteristics, with usability involving practical tasks (assignment completion) and user experience with the primary focus on users' emotions restraining both from pragmatic and hedonic aspects of the platform, service or system. A lot of users apply the phrases simultaneously. The phrase usability was used longer that the phrase user experience. Partially because the phrases are repeatedly used one after another, a user will at least need satisfactory usability to successfully achieve an assignment, while the emotions of the person may be secondary. As usability is
about accomplishing an action, aspects of user experience like information architecture and user interface can support or cripple a user's experience. If a webpage has "poor" information architecture and a user cannot navigate properly in the relevant time frame for things of interest, then his search journey and experience will not achieve satisfactory, effective and efficient levels of usability.

The platform can be developed as a standalone desktop application or a standalone webpage and is required to have a significant amount of interactivity.

![Figure 27. User Experience elements](image)

The professional that work on elements of UX are commonly refered to as UX designers. They examine and track users emotions in regards to a system service or application. Mainly focusing on elements such as level of use complexity, value and utility of the application, task completion efficiency, navigation and so on (Figure 27).

UX designers can also focus mainly on smaller divisions within the main application. For instance, they could observe the user’s experience when coming
to a website and needing to fill in the register form. How complex or easy is that action and how to optimize it if the users have a negative feeling. Also some aspects could be for payment processes in retail webpages such as Amazon. Was the overall experience of navigation and checking out pleasant and efficient of not?

It is important to keep in mind that a single action within a subsystem can have a significant impact on the overall user experience: the experience of needing to perform a key click, has an impact on the text message typing experience, and that impacts the experience of the messaging app, and even the whole phone. In conclusion the overall user experience is affected not only by the entire interaction process between user and application but also external elements such as brand market position, pricing, acquaintance opinions and media coverage.

The whole research process is overviewed and tracked by two different user experience groups. One has the main focus on feelings which include responses during immediate interaction: creation of meaningful interaction and assessing feelings. The other group’s main objective is to comprehend the long-term relationship among product recognition and the overall experience. It is imperative that those two have a positive connection as some studies show that it builds up the expansion of the customer base and reinforces brand loyalty. Every single phase of user experience such as momentary, episodic and long-term are significant, but the techniques and methodology how to create and assess these level can differ.
2.3.2. A historical overview

When we are speaking of the historical evolution of the phrase “user experience” we should state that it was widely popularized by its creator Donald Norman in the 90’s. His initial ideas was for the term to be used in correlation to application and service utility. From a short summary of his work from that time we can see that the phrase “user experience” was intended to serve as a sign of the change to insert affective elements as well as a prerequisite attitude concerns. A significant number of usability professional continue to examine affective elements correlated to end-users, and have been doing so for a considerable amount of time even before the phrase UX was popularized in the ‘90s. In a speech in 2008 [3], Norman addressed the misinterpreted use of the meaning due to:

1. Modern day accomplishments in mobile technology(social and hardware), and perceivable computing tech have enabled for the interaction between humans and computers to become an indispensable everyday activity. Because of this the move from usability engineering happening and providing a significantly wealthier range of user experience, where user’s emotions, core values and motivation are focused on much more. Keeping in mind the main focus points of how effective it is, how efficient and what are the satisfaction levels.

2. In the process of webpage creation and development the primary focus was to intertwine the needs of various partners that come from regions such as: brand, marketing, visual design, and usability. The partners from brand and marketing areas were supposed to dive into the interactive world where the elements of usability were of great meaning and value. Partners with expertise in usability had to keep in mind the needs of brand, marketing and visual composition prior to website development and creation. The field of user experience enabled an environment that tends to all partner needs ensuring that web pages would have a higher value, be effective and use to use.
The area of user experience serves mainly as an extended area of usability, to incorporate a wider overview of how users react to a specific application or service. The main focal point is to track and record point that provide value and pleasure to the users. However the universal definition is not yet set and it is still evolving.

The way we measure user experience with product that have interactivity od webpages varies. Methods being used for this can be in the form of focus groups, conducting questionnaires, and different techniques. To make things more easier for user experience researchers a standardized questionnaire has been developed in various languages ,and it is free for wide use.

The mark points in historical terms are the popularity growth of personal computer in the 80’s and the Internet in the 90’s [1]. Both of these trends were intertwined. Because of the rise of supporting elements such as user interfaces that used graphics in an extensive amount, science that researches cognitive abilities, and designing to aid and support people, a new fundament was created that was focused on the interaction between humans and computers. All of a sudden vast majorities of people were able to have computers, which indirectly implied that need for optimizing their use and functionality was greater. Concepts like design of interaction and usability were popularized from insights behind HCI. After the internet bubble occurred in the 90’s, a new wave of professions emerged with names like “Designer for the Web” , “Designer of digital Interactions” and “Architect of Information”. As the market began to grow and was being popularized workers were becoming more experienced with higher level of knowledge and skills. As a result more complex understandings were conjured and one of the term that was introduced was “User Experience”
2.3.3. Main principles and design process

The main premise of designing a quality user experience is that every interaction between the user and the product or application and every feeling that comes out of it, has to be carefully planned and thought through which will as an end result ensure high levels or user experience satisfaction. All the users needs and expectations have to be taken into consideration ensuring that the user flow will be smooth and easy to understand. It might look like tremendous challenge to achieve, but with adequate planning and execution, focusing primarily on breaking down the tasks into its component elements we can ensure good results.

Today the online acquisition of products has become more and more common and people are getting used to this type of purchasing method [3]. The experience revolving around the process is quite similar and repetitive. A user reaches the desired webpage, searches for the item of interest (typing the item name in the search box, or navigating through a catalog of items). After a successful search the user can read the item description and product reviews of other people. In the next stage the users goes to the checkout section where he inputs the bank card data and shipping address, and the web page confirms a successful payment and informs the user when to expect the delivery of the package.

That precise, simple, clean and casual experience in fact originates from a whole set of carefully planned and developed tasks. They include the visual look and feel of the website according to it's primary function, what is the user flow, and what can a user do [3]. These tasks together form various aspects of user experience. If we look into each specific layer of the experience creation model we can start comprehending the product creation process (Figure 28).
Figure 28. User Experience structure layers
http://hugh.thejourneyler.org/tag/usability/

a) Strategy layer

When thinking about products which main priority is to be functional and resources that have to be information oriented we have the same strategic problems (Figure 29).

The main concern is how to balance user needs with our own webpage objectives. Comprehension of our target group's needs and wishes is of significant value. In order to provide a unique user experience these needs have to be met. Our webpage objectives can help to support the users expectation in a fun and engaging way. These product objectives can be learning goals (“Learn 5 lectures today and earn 30 lingot points”) or other type of goals (“Share this article and inform your friends what are the benefits of language learning”).

Figure 29. Strategy layer [3]
b) **Scope layer**
From a functional perspective, the strategy is incorporated into a scope developing **functional requirements**: a precise explanation of the “feature set” of the application or service. From an information perspective, scope is shaped into **content specifications**: a detailed explanation of the different content components that will be needed (Figure 30).

![Figure 30. Scope layer [3]](image)


c) **Structure layer**
From the functionality perspective we give the capacity a structure with the aid of **interaction design**, where we provide a definition of the system behaviour in correlation to the user. For sources of information we define an **information architecture**, which has the main objectiove of arranging the content components in structured and clear way (Figure 31).

![Figure 31. Structure layer [3]](image)

d) **Skeleton Plane**
The skeleton layer is divided in to three main segments. **Information design** is a key element that has to be adressed here. It is imperative that the way how information is being presented is clean and understandeable. For products that are more functional the skeleton also incorporates **interface design**, that is structuring interface components so that the users are provided with a clear and functional interaction system (Figure 33).

![Figure 33. Skeleton layer [3]](image)
e) Surface layer
Concluding, the surface is the last layer. Regardless, of if we have a functionally-oriented application or a source of information, our main objective is the similar: The sensory experience with interactivity components developed by the end product which is often pretty complex and multilayered (Figure 34).

![Figure 34. Skeleton layer [3]](image)

2.4. Core universal elements of User Experience
A certain number of people only by chance use the phrases usability and user experience ano after another. Nonetheless, the term usability is more and more being used to present the level of product usability complexity or simple sad how simple it is to accomplish an imagined task, and is intimately connected with the term usability testing. Because of that, a lot of people view usability as an strategic form of usability testing. On the contrary, UX experts use the phrase user experience in a quite broader manner, covering a scope of visual style, user engagement, a complexity of use. We can say that user experience is better monitors and overviews the cognitive and physical activities between the user and the product (Figure 35).

To aid the objective definition and range of user experience actions, as well as to provide a clear measuring method, a group of people has created and defined a framework that closely explains four key segments of user experience, and what is the correlation with one another for the goal of designing a better product design and creating a high quality user experience.
2.4.1. Usability – Is it easy to use?

As people often use the phrase usability to indicate all segments related to user experience, it is more adequate to be considered a subsegment of user experience. The main premise of usability is how fast and easy can user accomplish their planned action while using a service or application [3]. There are various problems that cripple the user's capability of intended task completion. Here are a couple of examples.

Elements from the UX framework like intention, and engagement of users or the visual appeal of the product are not the main focus when talking about usability. It's main focal point is more related to everything that has to do with ease of use [4]. Elements such as the ability to learn, discover content quickly and easily, read and navigate through all screens and information with ease, these are all key segments of the term Usability.

In e-learning terms specifically language learning, going ‘beyond usability’ is about paying attention to learning methods and seeing learners engage with the product efficiently and voluntarily through an interface that does not hinder the ease of use of their goal completion. It is about creating environments that provide users flexibility and learner control. It provides an environment where the content is created in a way that it is fresh, engaging and stays in learner’s minds more easily. What is more, creativity and imagination should not be forgotten. Usability, in itself, is an extensive subject, and a vast group of experts studying
the interaction between humans and computers have dedicated their professions to progressing the field and enhancing digital-product user experiences. Nonetheless, they go far beyond users’ being able to accomplish their intended goals, learn about new features, and navigate through a webpage. In fact, some other dimensions of user experience are possibly quite more significant if we want to enhance business advancements and prosperity [41].

![Figure 36. Duolingo mascot platform guide, duolingo.com](image)

Perfect example of usability is duolungo’s „translation trainer“ (Figure 36). The user only needs internet, electricity and will power, the whole platform is online and free. After choosing the desired learning language the main trainer area appears which is super clean and simple with a small information load, clear navigation pleasant colors, readable font and main elements and clear instructions on how to proceed. The user and information flow for better experience is supported by a tutorial and a mascot which gives the experience character and warmth. All the words have translations if the user hovers over it [41].

![Figure 37. Duolingo selection trainer, duolingo.com](image)
The second most popular trainer is the „picture translation trainer“ (Figure 37) where again the user has clear instruction on how to proceed and to choose the obvious choice for translation of the world „girl“. After the correct answer a green checkmark appears and the progress bar moves forward.

![Image](duolingo.com)

Figure 38. Duolingo lesson selection tree–level unlock, duolingo.com

After registering the user redirected to the main „language learning tree“ (Figure 38) page where he has to choose the path and continue his language learning journey with the help of his personalised „owl trainer“ [41]. The user need only to follow the tree and expand his skills and knowledge which pretty much sums up the whole process from beginning to end. It is simple and it works which is the point.

![Image](duolingo.com)

Figure 39. Duolingo mobile interface, duolingo.com

Surely in today's modern fast-paced world a key element of usability is whether the platform supports mobile devices for experiences on the go, for „out of home experiences“ (Figure 39). Duolingo provides full support for different mobile devices which makes the usability scope very wide. Also keeping in mind different age groups they created a platform that supports young, middle aged, and old people alike.
2.4.2. Value – Is it useful?
As usability is a key factor of product design, it is definitely not as important and valuable for user experience in terms of driving enterprise growth and profit. We can name some companies that unfortunately have felt that on their own skin, their products have a very good usability, but are still not successful on the market. For instance, if we take a look into the mobile phone marketplace we can spot distinct differences. Classical phones are easy to use and simple but they are falling behind in terms of market share and popularity, why is that so? The main aspect is value. On smartphones users can, use messaging apps, video audio, read books, travel with gps, surf the web, take pictures, which increases the value of the product to the users and raises the overall user experience and satisfaction level.

What is the main indicator for value of a product in eyes of users? Balance between user needs and product capabilities and features. If the user can achieve all his intended goals with the capabilities of the product than it is of value to him. When talking about user needs it is important to point out that they have a direct and indirect value. For instance when using a product let’s say for language learning. A user can not only learn a language to develop his level knowledge and cognitive skills but also be able to communicate with the world which benefits him professionally and personally as well. That in return enriches users daily lives and has and additional value.

Value aspects are closely related to segments of user experience such as usability and desireability, but the most significant catalysts of valuer are functionality of a product and it’s features. Value is a core element of quality user experience.

Perceived value is closely related to the other elements of user experience such as usability and desirability, but the key drivers of value are a product’s functionality and features. Value forms the cornerstone of a good user experience. A application or service that does not have additional value to users desires and even life does not provide a rich and A product that does not add value by fulfilling user needs does not provide a useful and purposefull user experience—indepenent of a good visual appeal.
For instance, if we look at some Duolingo’s features we can see how they affect the product in these aspects. After conducting a study with two esteemed national universities they proved that 34 hours using their language learning platform provides the same level of knowledge as 1 university semester (Figure 40). With that the value of the product undeniably is higher as users know that they will have a quality experience but also save money in the process [41].

![Figure 40. Duolingo semester study comparison, duolingo.com](image)

Another value features is valid certification (Figure 41). So we already know that the level of knowledge is equivalent to university standards, but how will users efforts be recognized amongst educational and corporate institutions? With implementation of valid certification the users needs are met. They are recognized by both institutions and also the document can be posted on LinkedIn (social media platform for career opportunities) and shared with colleagues and potential future employees[41].

![Figure 41. Duolingo certificate badge and LinkedIn feature, duolingo.com](image)
Another key feature for value is that capability to use the platform for schools (Figure 42). Teachers can monitor and track the performance of their pupils and facilitate group activities which makes the whole experience more fun and engaging, and ensures a high retention amongst users. The simplification of the learning experience provides an added value.

![Figure 42. Duolingo for classrooms feature, duolingo.com](image)

The course contribution feature (Figure 43), allows for user that have proficient levels of knowledge in a certain language, to translate the existing courses into their own languages and expand the language choices with that providing new markets and regions with the ability to learn the language as well, which is an added value[41].

![Figure 43. Duolingo contribution feature, duolingo.com](image)
2.4.3. Adoptability – Will people start using the product?

This term has a close relation to usability. One of the main things that UX designer keep in mind to provide users needs with adequate solutions is that they use a set of usability methods for clean design features that induce users ability to discover information and navigate through the application. Nonetheless, these segments are far from being the same. The main focal points when it comes to adoptability are the tendency of a user to download, buy, install and start the use of the application or service. So it concentrates on the pre-contact stage between users and the product, and develops methods of how to enhance the chances of „product likeability“, while on the other side usability focuses on all activities connected to from the point when the user starts using the product. With this in mind we see that easy access to a service or application is one of the main concerns here. If we come back to our example company we see that the way how they have tackled this issue is to develop the product accessible to major device platforms IOS, Android, and Windows phone which according to IDC, as of 2015-Q2, globally these three platforms cover 99.3% of all devices in the world today. That ensures that almost every person on the planet can download and install the product. And also a great advantage is that this product can be used on desktop, mobile and tablet devices, which in return provides high levels of adoptability (Figure 44).

![Gamification poured into every lesson.](image)

![Learn anytime, anywhere.](image)

Figure 44. Duolingo learning on-the-go, duolingo.com
In regards to value adaptability also has a different stance. Despite a product providing high levels of additional value, user still might not use it due to accessibility challenges and obstacles, for instance if a product costs is very expensive than a significant number of users quite likely will not adopt the product. Duolingo tackled this problem by developing a business model that does not revolve around a recurring or one time payment system as it's competitors [41]. Their platform is completely free, which means that equally people from third world countries and developed western societies can use it without any financial discrimination issues (Figure 45).

![Duolingo platform](duolingo.com)

**Figure 45.** Duolingo platform is for free, duolingo.com

With that said we see how a carefully planned and conceptualised adoptability model can drastically affect the product not only from a user experience standpoint but even marketing. Because when you think about it these features have a high potential of being used in marketing campaigns, banners, promos, e-mail newsletters and so on. Because they are aspirational and they can attract large numbers of people easily, professionals, students and regular people alike. Other features like the ability to share language learning progress with your friends, translate complex sentences and grade other translations, providing pupils with the ability to learn a language for free on digital media, are also very important for the case of adoptability. With that said we have stated why adoptability should be considered as a key element of user experience.
2.4.4. Desirability – Is the experience fun and engaging?

At this point we have explored and taken a closer look into cognitive aspects of user experience. The main premise of desirability is that it focuses on emotional appel and happiness levels amongst users. There is considerable amount of products that provide easy to use services with high value levels but for some reason the users and marketplace do not use the product. That reason is called poor or non existing desirability[41].

Figure 46. Duolingo fun visuals and features, duolingo.com
But, the interesting thing is that this segment has a dual nature to it. That means that there are people that want to use products with low levels of usability. For instance a lot of video games are lacking in the usability field – their instructions are unclear and complex, navigation hectic, options panel not easy to detect and navigate, and information readability inadequate. With all those factors in place it is still not enough to stop the user to play the game as the experience is so immersive and engaging. It is important to know that an innovative and fresh visual appeal with engaging graphics is a significant part of desireability. With that said desireability should be characterized within the context or users objectives and goals. That implies that the visuals and graphics should support and aid the main interest and help users achieve their goals in a more fun and engaging manner. But all of this information should be categorized and planned according to our target audience. We all know that different target groups have different needs, so the end resultwhether a product is desireable or not worries in terms of audience preference. To further understand how desirability is dependent on a user’s context, let’s take a look two leading global language learning applications, and how the product meets the needs of different user groups in various ways. Both companies are profitable and have successful business and a large pool of users who are on a daily basis actively engaged with the product. The main difference is that duolingo uses a more simplified gamification approach with cute and cuddly graphics, which is slightly more appealing for the US market (Figure 46), whereas Babbel’s main focal point is on business oriented professionals of European background (Figure 47). These users like more clean and simplistic designs [43].

![Babbel dashboard](babbel.com)

Figure 47. Babbel dashboard, babbel.com
Also a key difference is in the way language courses are being developed – duolingo uses an generated algorithm, powered by users contributions, whereas Babbel has a professional team of 70 didactics experts who carefully formulate and develop each course in a perfect grammatical and didactical manner [43]. It doesn’t mean that with duolingo you cannot learn a language properly, but the level of proficiency and professionalism is obvious from the get-go (Figure 48).

Figure 48. Babbel dialogue trainer, babbel.com

With all of this said these differences did not occur by accident. It is connected to the main target audience. Babbel’s users are mostly people between 30-55 years old originating from European countries, whereas duolingo’s are 18-30 mostly from the US. Recently they have entered the school system with their product so even children from 8-18 with instructor led assistance are using the product (Figure 49).

Figure 49. Babbel word selection trainer, babbel.com
3. EXPERIMENTAL WORK

The main goal of my experimental work was to conceptualise and design an interface for an e-learning system that could be used within the corporate setting for educational purposes of employees of “Festo”, keeping in mind user needs both functionally and visually. As the company has a global presence in 76 countries worldwide it was imperative that the employees were able to use an e-learning system that could provide timely information about new products and appliances. The experience was intended to serve as a web-based system with different modules and levels of information categorized in specific elements and folders. With that said users scattered across different time zones would have the ability to access important data regardless of time factors and schedules. Depending on the needs and objectives of learning courses in regards to levels of knowledge of users, instructors would be assigned to overview and mentor certain individuals with more complex data and information. Furthermore the users would participate in a learning experience in simultaneous and non-simultaneous fashion via video messaging tools as skype and similar, with a product that would be highly engaging and visually appealing with respect to previously mentioned UX elements such as desireability, adoptability, value and usability. It is important to point out that I was only able to work on the design of the interface, but in the end due to financial and several other strategy planning obstacles was not able to develop and roll out a working prototype, but only work on design concepts which the company said that in their opinion in terms of future project planning was more than sufficient. Now I will show the final designs and explain some of the key points why was it designed in a certain way and what was the e-learning and user experience need from a theoretical point of view.
3.1. Final interface designs and user experience features for the e-learning platform.

3.1.1. Registration, search and navigation bars

One of the main things that the previous system was missing was a clear navigation through the product and appealing visuals that were consistent and easily understandable. Hence I created the new and registration, search and navigation bars to enhance the overall user experience and raise the value and usability of the product following strict company styleguides (colours and typography) (Figure 50).

The navigation menu in a product is like a road sign on a street or a level directory in a shopping mall. You cannot reach your destination without first knowing where you are. Like in real life, navigation in web design is very important and plays a major role in a product’s usability as well as in user experience.

The internal product search bar has several advantages: User can find fast what they need, it makes the product more user centric, it feeds the learner’s “I want to know attitude”, the search reveals new keywords which adds even more value, easy to us and understanding to the site, which in the end enhances the overall user experience and adoptability. The users also can create their unique

Figure 50. Festo registration, search and navigation bars
registration numbers which allows the system to track their performance and keep a history record of their activities and progress, which is very important for user engagement. When the profiles are created the learners can interact with each other with the messaging function and post comments and share knowledge about courses and their experience.

With the creation of subsection paginated pages (Figure 51) users are able to pinpoint and navigate their interest in a much easier and smoother way as the courses can be very segmented and granulated. With this can navigate very fast through subsegments of very complex topics with ease. One of the main problems that was present in the previous system was that it was not able to efficiently track the progress of each candidate and work simultaneously with a group of people or a single individual in a meaningful way. The teachers couldn't know how to exactly help and support each learner, but now with much broader data available to them, with the help of features like track progression and history aided by the messaging enabled features that problem is resolved. Instructor-learner interaction is enabled and possible regardless of the location of both parties and can be done in simultaneous or non-simultaneous fashion. Also it was intended that both parties have access to video conferencing for live 1on1 or group sessions.
3.1.2. Slideshow, audio and video player

Another key issue in the old system was that the video player was not connected to the picture gallery in the sense of clear connected information, so the learning experience was not that efficient. Now after each lesson the users can in the same section find the gallery of pictures that is relevant to the learning information from the video and they can save and download the for print or stick to the gallery and navigate it online or offline (Figure 52).

For a better learning experience users can also download all the content as well as a supported glossary of key terms. All the sections are supported with highly useful and shortened efficient information. For multilayered information that cannot be easily visualized 3d animations are used to support and aid the learning experience which also adds value in regards to adoptability. Videos and screenshots can be shared internally amongst learners. Furthermore the video quality can be adapted according to the viewing device, higher for desktop and wireless connections, and lower for mobile devices for learning experiences on-the-go. Meaningful integration in the e-learning platform with a better navigation and more appealing visuals were also here accomplished.

Figure 52. Festo gallery and video player
3.1.3. Calendar and new event creation feature

The key to any successful e-learning experience, regardless of the subject matter or e-learning environment, is organization. Without organization, learners will not have the opportunity to get the most benefit from e-learning courses, and online facilitators simply won't be able to deliver e-learning courses effectively. One of the most powerful organizational tools available today, particularly for e-learning professionals, is calendar feature. It offers them the ability to keep their e-learning course plan on track since it notifies them of upcoming learning events and ensures that assignments and assessments are completed on time. One of the major concerns in the previous e-learning system was the inability to track and record the progress in the form of certain timeline and how to connect the data in a meaningful way with the users and the instructors at the same time. Hence I created designs for a calendar with event creation functions (Figure 53). With this feature, not only the learners have access to a clear overview of course sections in regards to a time point, but also teachers can set events and track their progress. That in return can maximize teaching efficiency in a more didactical fashion. Other advantages of this feature are the ability to Include reference
information and other links with calendar events; send out invitations to current and/or potential learners via the calendar; Inform learners of important changes to the schedule or eLearning course plan; Encourage learners to post comments/questions on calendar events.

3.1.4. Notifications, buttons and gamification features

![Notifications and buttons](image)

Figure 54. Notifications and buttons

Another group of key elements that was missing from the e-learning platform was an visually appealing set notification buttons in combination with gamification elements (Figure 54). In an efficient learning experience it crucial that the user has a visually appealing learning process as that significantly boosts the engagement level to the platform and supports learning with ease. Short-term and long-term it is imperative that these elements are prepared best as possible as they have a huge influence on the value, adoptability and usability of the platform. In today’s world, e-learning is more and more supported by gamification elements because of their impeccable boost of the learning experience. Assigning points for achievements, loosing hearts for mistakes, gaining stars for successfully achieved courses in fast pace with a
minimal number of mistakes can have a serious boost on the user’s engagement. It makes learning fun and like a game.

Other benefits of gamification are that: It evokes friendly competition; provides learners with a sense of achievement; provides an engaging learner experience leading to anticipated behavior change and encourages learners to progress through the content, motivate action, and eventually influence behavior. So with the addition of all these elements users have a more diverse experience (Figure 55).

Figure 55. Buttons and gamification elements
3.1.5. Switches, progress, and scroll bars

In conclusion to the feature creation process the switches progress and scroll bars were developed more in the sense of visual design and appeal. The focus was to aid the user experience with clean and clear transitional elements in the learning platform. Nonetheless, surprisingly enough they also have a significant usability and navigational value as the users can “play around” with the switches and see what do they activate, whereas the progress bar reinforces the users awareness of the time needed to complete the lessons. With the scroll bars users can more easily and faster navigate through the learning content and accordingly skip some sections if they find it fitting (Figure 56).

Figure 56. Switches, progress and scroll bars
3.2. Conducting focus groups and measuring user satisfaction

For my main testing purposes as I was very limited in this area of reaching learners from the company as from one side they were scattered across the globe and as from the other we didn’t have a finished prototype but only final designs with a strong user experience theoretical approach. I decided not to use online surveys or polls as users would have an even more limited overview of the situation so I organized focus groups and facilitated meetings where I explained the product interface and new features. The main methodology was to form groups of 5 people with the same educational background but gender mixed in similar age groups and to see how they value the product in comparison to the previous one, and to rate the main user experience values usability, value, adoptability and desireability. As the testing was conceptualised to have similar points to a classical A/B test I wanted to have only one varying factor amongst the groups which was the age category. In my opinion learning experience ability varies most in regards to age, if the educational background is similar. My hypothesis is because of higher visual appeal and a clearer structure in the approach of creation and conceptualisation of both design and functional elements (features) that the overall user experience will be higher than it was with the previous product. Nonetheless keeping in mind that the groups will be divided into age groups varying form 19-63 I am very eager to see if the results will support my hypothesis and in which amount.
3.2.1. Use of focus groups for e-learning

While focus groups are often associated with television shows and tangible products, they can actually be invaluable feedback tools for e-learning professionals. Focus groups in e-learning provide opportunity to gain insight into how a certain e-learning deliverable will be received and if it will in fact provide a truly effective learning experience. It will also allow for fine tuning of the e-learning project by determining its strengths and weaknesses[20].

a) More effective than surveys and polls.

While surveys and polls can be helpful when trying to get feedback for the e-learning course or online training, focus groups are much more effective when it comes to gauging learner experience. This is primarily due to the fact that online surveys offer limited insight. They typically consist of very narrow questions, and very few people choose to actually leave comments if you do leave space in the survey for a more in depth feedback [20]. Not to mention that learners usually don't have the time or the motivation to complete surveys. On the other hand, e-learning focus groups are handpicked individuals who are there for one clear purpose: to test out the e-learning deliverable so that a powerful learning experience can be created. Therefore, they are going to give ideas and opinions on what is working and what needs to be improved upon moving forward.
b) **Gain an in depth understanding of learners benefits.**
Not only can e-learning focus groups provide the opportunity to determine the strong and weak points of the platform, but they can also help in identifying the benefits that learners will receive upon completion. For instance, we can ask the e-learning focus group what they have learned from the discussion and how they feel this knowledge can benefit them in the real world [20]. This will offer insight into how the learners will ultimately be able to apply the information they'll acquire. It can also allow to determine if the content is being presented in such a way that they can retain knowledge for later use or if it is causing cognitive overload.

c) **Helps in determining e-learning courses' prerequisites.**
It's also important to mention that focus groups in e-learning offer the added advantage of determining the e-learning deliverable's prerequisites. For example, if members of the focus group don't have any prior experience with the subject matter and seems confused after completing a course, this can show that learners will need to have some professional knowledge before they enroll for the e-learning course. After that, prerequisites can be added into the syllabus or course description, such as: “learners need to have prior knowledge of basic sales terminology” or “learners should have completed the beginner's customer service module before taking this e-learning course”.
d) **Allows exploration of known issues.**
For any potential issues with the e-learning development strategy or the design of the e-learning course, an e-learning focus group can be created that delves into that particular problem. For example, rather than having them assess the entire e-learning course, they can be provided with the concerned module and asked with specific questions that help in narrowing down how to solve the problem. Then, the focus group should be asked to assess the module once again, so as to ensure that the issues have been fully addressed. In addition, if any new problems arise as a result of specific improvements, e-learning focus groups can help to identify those as well.

e) **More convenient and cost efficient than one-on-one interviews**
While one-on-one interviews with learners may provide a detailed analysis of how the e-learning course will fare after it’s rolled out, this particular feedback technique can be costly and time consuming. Generally, these individuals should be compensated for their time, which is typically more than the pay of a focus group member. In addition, discussions with several different individuals should be conducted in order to get a general overview of the e-learning deliverable's strengths and weaknesses [20]. When conducting a focus group, a facilitator can speak with several individuals at once and doesn’t have to worry about scheduling conflicts that could delay the interview. There's no wasted time, and e-learning feedback is provided immediately that can help to fine tune the e-learning course quickly and conveniently.
f) **Offers the opportunity to fine tune every aspect of the e-learning deliverable before launch.**

There are several things to consider before offering the e-learning course to learners. A question needed to be answered whether the content is well organized and well written, or if the overall design of the e-learning course allows for ease of navigation. In fact, there are so many issues to consider that some of them may just slip through the cracks and end up diminishing the quality of the learners’ experience [20]. However, there is a number of focus group members trying out the e-learning course before it is rolled out, there’s a good chance that every aspect of the e-learning deliverable will be carefully assessed and analyzed. As the saying goes: “two sets of eyes are better than one”. In a focus group setting, all eyes are on the quality of finishing the e-learning deliverable.
### 3.2.2. Measuring user experience and satisfaction

Table 1. Group of 5, age group 19-25, mixed gender, engineering background.

Points of criteria – 1 Below expectations – 2 Met expectations – 3 Above expectations

<table>
<thead>
<tr>
<th>USABILITY</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support users desired workflows</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meets common user goals and objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The help feature is concise, easy to read and written in easy to understand language</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Call to actions (e.g. register, add to basket, submit) are clear, well labelled and appear clickable.</td>
<td></td>
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<tr>
<td>The current location is clearly indicated (e.g. breadcrumb, highlighted menu item).</td>
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<tr>
<td><strong>VALUE</strong></td>
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<td></td>
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<tr>
<td>The new features add additional value to the system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The information is organised in a clear way with high visual appeal od design elements</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>The information is available on mobile platforms for learning on-the-go</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The content is appropriate and sufficiently relevant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help and instructions (e.g. examples, information required) are provided where necessary.</td>
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</table>

**ADOPTABILITY**
<table>
<thead>
<tr>
<th>Feature</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The features are easy to use, and are understandable</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>The experience is highly recommendable</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>The messaging feature is easy to use and helpful</td>
<td>😊😊😊</td>
</tr>
<tr>
<td><strong>DESIREABILITY</strong></td>
<td></td>
</tr>
<tr>
<td>The experience is fun and engaging</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>The gamification elements are successfully integrated</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>The star and badge system is focused on organic learning and not over-competitive</td>
<td>😊😊😊</td>
</tr>
</tbody>
</table>

With the final results, we have concluded that the gamification features are very interesting to the group as in their opinion, it adds higher value and differentiates itself from other learning platforms. This young age group is used to gamified platforms with learning content and do not think that the method is over-competitive and stressful but fun and engaging. Overall, the visual appeal is great and fits very well for this age group (Figure 60).

When it comes to areas for improvement, the help feature was not properly conceptualized, and certain areas are not clear and understandable.

---

**User experience satisfaction**

<table>
<thead>
<tr>
<th>Satisfaction Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above expectations</td>
<td>88%</td>
</tr>
<tr>
<td>Below expectations</td>
<td>12%</td>
</tr>
</tbody>
</table>

Figure 60. Overall user experience satisfaction of group 1 (19-25)
Table 2. Group of 5, age group **25-35**, mixed gender, engineering background. (Points of criteria – 1 Below expectations – 2 Met expectations – 3 Above expectations)

<table>
<thead>
<tr>
<th><strong>USABILITY</strong></th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td>Support users desired workflows</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Meets common user goals and objectives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The help feature is concise, easy to read and written in easy to understand language</td>
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<td></td>
</tr>
<tr>
<td>Call to actions (e.g. register, add to basket, submit) are clear, well labelled and appear clickable.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The current location is clearly indicated (e.g. breadcrumb, highlighted menu item).</td>
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<table>
<thead>
<tr>
<th><strong>VALUE</strong></th>
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</thead>
<tbody>
<tr>
<td>The new features add additional value to the system</td>
<td></td>
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<tr>
<td>The information is organised in a clear way with high visual appeal of design elements</td>
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<td></td>
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<tr>
<td>The information is available on mobile platforms for learning on-the-go</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>The content is appropriate and sufficiently relevant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help and instructions (e.g. examples, information required) are provided where necessary.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th><strong>ADOPTABILITY</strong></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>The features are easy to use, and are understandable</td>
<td></td>
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</tbody>
</table>
The experience is highly recommendable

The messaging feature is easy to use and helpful

**DESIREABILITY**

The experience is fun and engaging

The gamification elements are successfully integrated

The star and badge system is focused on organic learning and not over-competitive

With the final results we have concluded that the new features add high value to the learning platform and that the designs have a way higher visual appeal which is engaging and comforting for the users. The experience is recommendable with valuable content that meets users’ needs and objectives (Figure 61).

When it comes to areas for improvement, the help feature was not properly conceptualized, the gamification elements need to be integrated in a more complex and engaging non-aggressive fashion as the majority of users said that it is too competitive, which leads to less focus on learning.

**Figure 61. Overall user experience satisfaction of group 2 (25-35)**
Table 3. Group of 5, age group **35-45**, mixed gender, engineering background. (Points of criteria – 1 Below expectations – 2 Met expectations – 3 Above expectations)

<table>
<thead>
<tr>
<th>USABILITY</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support users desired workflows</td>
<td>☹</td>
<td>☹</td>
<td>☹</td>
</tr>
<tr>
<td>Meets common user goals and objectives</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>The help feature is concise, easy to read and written in easy to understand language</td>
<td>☹</td>
<td>☹</td>
<td>☹</td>
</tr>
<tr>
<td>Call to actions (e.g. register, add to basket, submit) are clear, well labelled and appear clickable.</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>The current location is clearly indicated (e.g. breadcrumb, highlighted menu item).</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>VALUE</th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The new features add additional value to the system</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>The information is organised in a clear way with high visual appeal od design elements</td>
<td>☺</td>
<td>☺</td>
<td>☺</td>
</tr>
<tr>
<td>The information is available on mobile platforms for learning on-the-go</td>
<td>☾</td>
<td>☾</td>
<td>☾</td>
</tr>
<tr>
<td>The content is appropriate and sufficiently relevant</td>
<td>☾</td>
<td>☾</td>
<td>☾</td>
</tr>
<tr>
<td>Help and instructions (e.g. examples, information required) are provided where necessary.</td>
<td>☹</td>
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</tbody>
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<table>
<thead>
<tr>
<th>ADOPTABILITY</th>
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</thead>
</table>
The features are easy to use, and are understandable

The experience is highly recommendable

The messaging feature is easy to use and helpful

<table>
<thead>
<tr>
<th>DESIREABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>The experience is fun and engaging</td>
</tr>
<tr>
<td>The gamification elements are successfully integrated</td>
</tr>
<tr>
<td>The star and badge system is focused on organic learning and not over-competitive</td>
</tr>
</tbody>
</table>

This age group finds the overall experience interesting and helpful with clean structure and interesting visuals which is for them slightly new and they are not used to it but still it is not a problem to use a platform like this. Overall good satisfaction with a good user experience from a learning perspective (Figure 62).

Room for improvement is needed in the area of the help feature and the gamification elements are not well integrated. This age group is not used to learning with gamification elements so the experience is not ideal. Also an interesting point is that this age group considers the information not sufficient enough as they are used to long articles with little visuals.

<table>
<thead>
<tr>
<th>User experience satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below expectations 31%</td>
</tr>
<tr>
<td>Above expectations 69%</td>
</tr>
</tbody>
</table>

Figure 62. Overall user experience satisfaction of group 3 (35-45)
Table 4. Group of 5, age group 45-55, mixed gender, engineering background. (Points of criteria – 1 Below expectations – 2 Met expectations – 3 Above expectations)

<table>
<thead>
<tr>
<th>USABILITY</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support users desired workflows</td>
<td></td>
<td></td>
<td>😞</td>
</tr>
<tr>
<td>Meets common user goals and objectives</td>
<td></td>
<td>😊</td>
<td></td>
</tr>
<tr>
<td>The help feature is concise, easy to read and written in easy to understand language</td>
<td></td>
<td>😞</td>
<td></td>
</tr>
<tr>
<td>Call to actions (e.g. register, add to basket, submit) are clear, well labelled and appear clickable.</td>
<td></td>
<td>😊</td>
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<td>The current location is clearly indicated (e.g. breadcrumb, highlighted menu item).</td>
<td></td>
<td>😊</td>
<td></td>
</tr>
<tr>
<td>VALUE</td>
<td></td>
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<tr>
<td>The new features add additional value to the system</td>
<td>😊</td>
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<tr>
<td>The information is organised in a clear way with high visual appeal of design elements</td>
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<tr>
<td>The information is available on mobile platforms for learning on-the-go</td>
<td>😊</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The content is appropriate and sufficiently relevant</td>
<td>😞</td>
<td></td>
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</tr>
<tr>
<td>Help and instructions (e.g. examples, information required) are provided where necessary.</td>
<td>😞</td>
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<tr>
<td>ADOPTABILITY</td>
<td></td>
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<tr>
<td>The features are easy to use, and are understandable</td>
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</table>
This age group finds the platform as something new and interesting but they need more time to get used to it and do not find this way of learning very appealing. Overall the visuals look nice to them, but the information is not organized and structured according to their needs, and the learning experience is not ideal (Figure 63).

Room for improvement is needed in the area of the help feature and the gamification elements are not well integrated. This age group is not used to learning with gamification elements so the experience is not ideal. Also an interesting point is that this age group considers the information not sufficient enough as they are used to long articles with little visuals.

Figure 63. Overall user experience satisfaction of group 4 (45-55)
Table 5. Group of 5, age group 55-63, mixed gender, engineering background. (Points of criteria – 1 Below expectations – 2 Met expectations – 3 Above expectations)

<table>
<thead>
<tr>
<th>USABILITY</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<tbody>
<tr>
<td>Support users desired workflows</td>
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<tr>
<td>Meets common user goals and objectives</td>
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<tr>
<td>The help feature is concise, easy to read and written in easy to understand language</td>
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<tr>
<td>Call to actions (e.g. register, add to basket, submit) are clear, well labelled and appear clickable.</td>
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<td>The current location is clearly indicated (e.g. breadcrumb, highlighted menu item).</td>
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</tbody>
</table>
Above expectations 44%
Below expectations 56%

User experience satisfaction

This age group is the most delicate as they are spanning from 55-63 which means some of them are already in “retirement mode”, hence they have very specific needs, and the learning experience of this group is quite different from the previous ones. Not one point from the questions was graded that it exceeds expectations. Overall they think that the visual appeal is nice, and that the information structure is decent, but nothing more than that (Figure 64).

When it comes to elements that they dislike, the list is the biggest one so far. Missing help feature, not appealing gamification elements, too competitive, the content is not sufficient and clear, and it doesn’t support their workflow. The user experience is far from good, and they would not recommend this platform.

Figure 64. Overall user experience satisfaction of group 5 (55-63)
4. CONCLUSION

Through the experimental work in overall user experience testing of the e-learning interface and designs using the method of focus groups, where the groups were consisted of 5 persons of mixed gender, similar educational background and age group, testing 4 main user experience core universal values: usability, value, adoptability and desirability of the product, interesting data were revealed. The results of 5 main age groups (19-25; 25-35; 35-45; 45-55; 55-63) have proven that the overall user experience is better in the opinion of almost every group except one, which would translate that 80% of the tested users (spanning from 19-55) think that product designs have features that provide higher level of value and meaning for synchronous and asynchronous learning, knowledge sharing and faster skill development. Also they found that the usability is much more user-centered, friendly, and easily understood through the utilization of a better information structure and cleaner design. The adoptability level is also high as they think that the new product designs are highly shareable fun and engaging. Through the creation of features like messaging and post sharing the users find that the newly acquired tips and tricks are easily shareable and can be tested with the instructor in a short matter of time independent of their location which is a huge factor for a satisfactory learning experience in terms of feedback. Also the calendar feature has high scores as it is both functional and visually appealing. Both users and instructors can crate events, monitor and track the progress of each individual, or group, and accordingly consult them on future steps. In terms of visual appeal and implementation according to FESTO style guides the majority of testers agree that it adds a high value of appeal and likeness which makes the whole experience much more engaging and fun, and that results in an easier, smoother and more understandable learning experience. On the other hand when we are referring to features and areas that have room for improvement we certainly have to mention that the gamification features are not well conceptualized in terms of functionality as, on a micro level, per category, 90% of the testers think that the features emphasise competition too much which in return diminished the overall learning experience. Also there is a justified fear
that the scores might be misinterpreted amongst in-line managers and that they could be used against their progress, and add even more pressure in terms of job insecurity. Certainly gamification in e-learning is a big trend that is blooming but efficient implementation, in a way that needs of various age groups are adequately met, is quite complex and needs a more organized and structured implementation model. One big category that was missing and that 100% of the testers did not like is the help feature. Certainly it is an element that needs to be implemented and is of great functional use to groups independent of their age and computation proficiency.

Overall the learnings of this study are indeed useful and insightful and with the implementation of a couple features and small adjustments the designs can be even better, but at this point the overall user experience exceeded expectations by 80% in relation to the previous e-learning platform. Festo is very happy with the results and they have stated that they will continue with the development of the e-learning concept, and have rated the overall results very good both functionally and visually (Figure 65).

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**User experience satisfaction**

- **Above expectations**: 80%
- **Below expectations**: 20%

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Figure 65. Overall user experience satisfaction in general
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