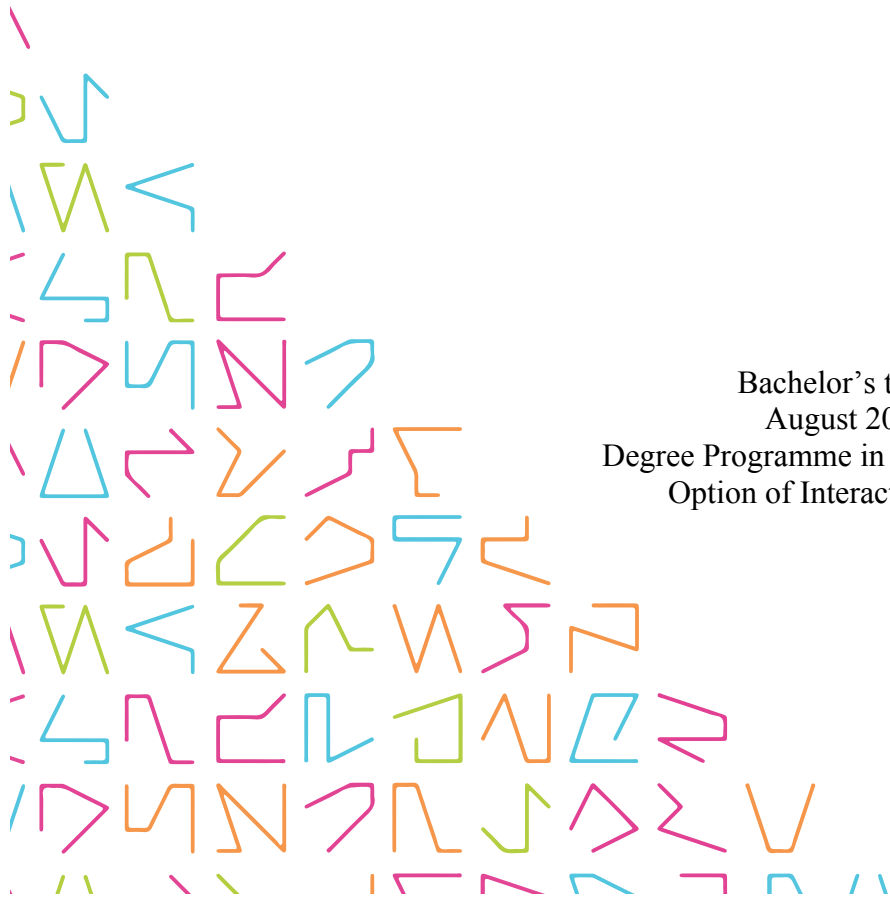


DESIGNING AN EFFECTIVE E-LEARNING EXPERIENCE

Thesis project: Memocate

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Bachelor's thesis
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ABSTRACT

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Learning is a slowly-changing process. Throughout the centuries, learning has not matched the use of technologies and tools of the time, and the newly acquired behavioral and learning patterns of the learners haven't been properly considered by the instructors. In recent years, e-learning has become seemingly more prominent in modern society as technological advancements took place. Yet, in the abundance of available e-learning services, it is hard to define one that helps with memory retention, tracks the learners' activity and progress, and generally guides the learners on the journey towards their initial learning goal.

The objective of this thesis was to define the way we, humans and learners, should learn digitally. It was done by defining the principles of learning experience design, with the insights coming from neuroscience, cognitive psychology, design thinking, service design, and user experience design to set up the core of the guidelines.

To reveal the key learning experience principles, an extensive theoretical research has been undertaken. The research elements have been gathered via literature review, interviews with the field professionals, surveys with international audiences of learners, and comprehensive analysis of the e-learning products that are available on the market today.

In contemplation of the validity of the defined learning experience design principles, they have been applied to Memocate, the e-learning service that aims to educate family and professional dementia caregivers on the recent research on communication and interaction with the dementia patients.

The study suggests that learning experience design principles become effective and usable when applied to any e-learning service, and can also be used in a learning experience review sessions to reflect on and iterate the educational process. Moreover, the mentioned principles address the learning patterns of today's society, therefore allowing the instructor or course designer to set up a novel and efficient approach to learning.

Key words: learning, e-learning, learning experience design, design principles

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GLOSSARY or ABBREVIATIONS AND TERMS (choose one or other)

LX	Learning Experience
UX	User Experience
UI	User Interface
Dementia	A term that describes memory loss and other mental inabilities severe enough to disrupt daily life
PWD	Person (people) with dementia
CG	Caregiver
FCG	Family caregiver
PCG	Professional caregiver
Nursing (care) home	A private institution providing residential accommodations with health care, especially for elderly people
MVP	Minimum Viable Product
LSC	Lean Service Creation
REM sleep	A kind of sleep that occurs at intervals during the night and is characterized by rapid eye movements, more dreaming and bodily movement, and faster pulse and breathing.

1 INTRODUCTION

Learning is in the very core of our existence. Our survival depended on how well we remembered our enemies, our prey, and how well we could get out of challenging situations. However, in modern society, learning means success. With the technological development, learning started taking place digitally, and so the learners shifted to new channels to acquire new knowledge and skills. It's hard to name something that people cannot learn online these days: languages, cooking, constructing furniture, or even coding with Python are all available to be studied anywhere, at any time.

Today, we can try dozens of e-learning services, some of which we continue learning with, and the others that we leave behind. Some that let us acquire knowledge we came for, and those that don't. Some that make us remember new findings long after we studied them, and the others that will have us forget everything we just learnt.

The question arises. What makes an e-learning service successful?

This thesis explores the very definition of a functional and modern approach to e-learning. It examines how a learning experience is designed, with the clues coming from neuroscience, cognitive psychology, design thinking, service design, and user experience. Lastly, the thesis gathers the principles of Learning Experience design, that can be applied to build or improve an e-learning services.

This manuscript will guide a reader through the basics, such as the definition of learning and its working mechanism from the perspective of neuroscience and cognitive psychology; spark a discussion on learning experience design and learner engagement and motivation methods; and lastly, showcase how one can approach designing the learning experience via the case study.

The author of the thesis works as a Design Director and Service Designer in Memocate, a young company that is developing a solution for dementia caregivers' education. The practical part of the thesis is dedicated to Memocate's design process. It covers extensive user research and analysis, service design elements, learning experience design, and user experience and interface design.

2 THE EVOLUTION OF LEARNING

Learning techniques and methods started their slow development in an early prehistoric and uncivilized world. The younger generations received, consciously or unconsciously, the knowledge, skills, and values that were previously established in the society that they were a part of. Yet, despite such a huge gap in time, many instructional techniques and learning methods are still linked closely to how people learn today (Appendix 1).

In the pre-literate era, the time when writing hadn't yet been invented, most of the learning happened through observation. Already then did the first instructors appear to become role models to the students by being an example and bringing lore and instruction to so-called "bush schools" of that time.

As the world kept getting more civilized, with people learning to write, read, and count, the need for a more formal educational institution emerged. The pre-modern era began with the first proper schools being established. The youth studied under a strict and unforgiving regime, as obedience and discipline were the norms of communities at that time. The main school activities included drilling, copying, and memorizing. The end of the pre-modern era is first and foremost associated with furthering the education, introducing lyceums, universities, academies, and other higher institutions.

The pre-modern era gradually shifted to modern era, which had a significant change - printing was invented. Already then have the instructors noticed that the students have individual differences in learning, but nevertheless the schools remained rather "uniform", with a single format of teaching, studying (e.g. copying and giving content back to the teacher), and assessing learning (e.g. oral/written examination).

The development of communication media – telegraph, television, telephone, radio, film – started to enhance the era, which would eventually be known as late (or high) modernity. Nonetheless, new technologies barely infiltrated into the core of the educational processes. Education remained teacher-centric. Once more did instructors realize that not all students benefited from this way of education.

Humanity then entered the postmodern (or digital) age, in which we now live. For a while the developing technologies haven't been included in classrooms. But this started to

change when scholars and researchers attempted to review the curriculum and make it a better fit to the contemporary challenges and opportunities. Despite most of the world's population not having a direct access to internet (statistics from World Internet Uses and Population Stats 2008), the youth keeps engaging with digital products at critical developmental stages: the debate on whether that's beneficial or harmful continues.

Critics believe that the use of digital products decline literacy and autonomy, whereas enthusiasts vouch for digital products as means to cultivate social and intellectual skills. Despite this separation in views, modern technology has affected the learning preferences and styles of the youth. It has therefore influenced learning to become more social, informal, and engaging, with the elements of problem-solving approaches and hands-on practice that make the students' conceptual thinking and knowledge retention better.

Learning has now shifted to a life-time experience, necessary to adjust to the rapidly shifting requirements of the modern workplace and culture (Weigel, James & Gardner 2009). And most importantly, learning has been made digital.

2.1 Traditional education vs. Digital education

While technologies are immersing into the learning processes, the debate on whether digital education or traditional education is better is still ongoing. The following section addresses the differences, advantages, and drawbacks, of both education types.

Social aspect of learning

Traditional education is enhanced by its social-element. It makes the learner feel more connected to the students and therefore more immersed into the learning process. However, in the social learning environments, it's often harder to focus; it takes only one distracting person to affect the learning process of everybody else (Andreatta 2017). Therefore, digital education gives the learning the advantage to focusing better, and if the social channels are integrated into the learning experience, they can help the learner from becoming a "lone learner". Additionally, digital learning awards its learners with the au-

tonomy and freedom to use the service at any given moment, which makes it a more successful way of learning, especially for adults, who are independent by nature (Piccioli 2014).

Direction

Furthermore, traditional education is generally more teacher-centric – teachers act as the role models, but also as the fountain of knowledge (Weigel, James & Gardner 2009). This approach is drastically different in digital education, where the student's voice is heard, to the point of students being involved into the course development and iteration processes (Kilgore 2016).

Feedback

Digital education steps back from the pedestal of advantages when focusing on feedback. Student progress tracking is still underdeveloped in the field of digital education. The reason behind this is that it's extremely hard to imitate face-to-face feedback digitally. The instructor is often aware of whether a student is struggling; it only takes a single glimpse to discover. When this is the case, the student receives immediate feedback on how he or she is doing, and if necessary, help and re-explanation of challenging topics. Moreover, the instructor is first and foremost a companion that guides the student through the learning process. It's often the case that people who practice with an instructor rarely practice on their own, because they don't get the same amount of support and sense of companionship individually. Still, digital education can produce feedback that's inconceivable for the real instructor; extensively detailed feedback on accuracy and timing. From there, digital education services can measure progress and keep records on the learner's performance, which stays available to the learner at all times (Neilson 2017, Sørensen 2017, Appendix 2 & 3).

Conclusion

To sum up, both digital and traditional education systems have their own pros and cons. Depending on the ultimate goal and the learning outcome, one can have a stronger preference for either. Digital education is most certainly developing quite rapidly, and perhaps even mimicking an instructor would soon become possible - as long as communication and feedback are looked at with creativity (Sørensen 2017).

2.2 The learning process

Learning can be described as entering new information into memory by studying and putting new knowledge into practice (Norman 1982, 1, 80). Another way to describe learning is the way to tap into some potential and self-develop to ultimately become a better self (Andreatta 2017). Altogether, as Donald Norman (1982) put it, learning is a way to ‘take in new ideas and profit from experience’.

The goal of learning is ultimately to master a certain skill that can further on be performed automatically, without conscious attention to the task. However, to understand learning better, it’s critical to know how the human brain works, and which processes newly acquired information goes through.

2.2.1 The neuroscience of learning

According to professor Andreatta (2017), the neuroscience of learning ‘explores how the central nervous system and peripheral nervous system work together to create and retain new knowledge and skills’. Clearly, the memory and, most importantly, the neurostructure of the brain play a crucial role in learning.

From the neuroscientific perspective, learning happens at a moment when two neurons fire together. Learning and repetition minimize the delay at which the neurons fire; at some point, when the neurons are close enough to each other, they would synchronously fire, and that’s the moment when learning is maximized, and a memory is created. (Yassin 2017, Appendix 4).

2.2.2 The memory center of the brain (Hippocampus)

The hippocampus, a section of the brain that sits deep in the temporal lobe (the part of the brain that allows us to comprehend the world around us), appears to be responsible for creating and retaining memories. In order for the hippocampus to get activated, the learner should tune in on something and get focused. In addition, the hippocampus is our ‘data drive’, and just like any drive it has a limited capacity – working memory can only hold information up to 20 minutes at a time (Andreatta 2017). Therefore, whenever designing a learning experience, the information should be broken down into smaller chunks that are more easily digested and don’t require a long-time focus.

2.2.3 The emotional center of the brain (Amygdala)

Emotions and feelings, too, play a crucial part in learning. They tap into the amygdala - another learning-related part of the brain that sits right in front of a hippocampus, physically attached to it; once stimulated by the environment and getting alerted, it serves the function of sorting out memories as significant or not. The amygdala therefore plays a key role in memory (Andreatta 2017). Margaret Bradley and her colleagues (1992) have proven that ‘pleasantness as well as arousal are important at the initial stage of memory formation’. That’s why making the learning process more positive by adding gratitude, mindfulness, and/or humour, maximises the learning potential (Andreatta 2017).

2.2.4 Use of senses on learning

Another way to boost learning is to activate and evoke as many senses as possible. Multi-sensory learning usually involves two or three senses within the same activity; the most commonly used senses in learning are auditory (through ears), visual (through eyes), tactile (through touch), and kinesthetic (through body movement). Furthermore, by simultaneously utilizing the back part of the brain, which is responsible for visual representation, and the temporal part of the brain, which is responsible for audial representation, learning gets significantly enhanced (Yassin 2017). Other sensory cues can prove effective as

well. For example, linking new memory to olfactory cues (in other words, a smell) results in a faster and more effective learning (Yassin 2017). Despite the diversity of the senses that can be used in learning, some of them can also cause certain errors. For instance, when recalling visually presented material, people tend to make phonological errors in information retrieval, because visual information is recorded auditorily in primary memory (Norman 1982, 21).

2.2.5 Rest and learning

Rest has a critical effect on learning. While we sleep, the neural pathways ‘refire’ as the circuit of what we learned in a day activates. At the same time, the hippocampus keeps sorting out the memories by relevance, but most importantly, it attaches new memories to the existing ones to build stronger connections. This happens during REM sleep, and therefore it is important to get a good night’s sleep in order to get the most out of a learning experience. The same is true for giving learners a break during the intense learning sessions, so that they can process and start storing the new insights (Andreatta 2017). This process is also described by cognitive psychologist Donald Norman (1982) as information that passes through primary memory, in which we take control over processing of information, and secondary memory, in which memories interrelates with the available knowledge.

All in all, forming links and relationships lies at the heart of our memory abilities; associations help us discover similarities as well as use past experiences to interpret the present (Norman 1982, 25).

By combining a good rest and reorganizing and spacing the learning material through time, incredible results in learning can be achieved. In a study (Bell et al. 2014) it was found that long-term memory is enhanced by both spaced delays on memory, and sleep episodes that take place prior to restudy sessions. Another group of scientists (Carpenter et al. 2012) have been closely studying the spacing effect itself. Spacing effect refers to two or more learning sessions that are separated by a certain interval of time (a spacing gap), which is followed by another interval (a test delay), at the end of which comes the final test. The study confirms that spacing effect helps produce better memory retention, and it’s been discovered that the optimal spacing gap equalled 10–20% of the test delay.

In other words, the longer the test delay, the longer the optimal spacing gap (Carpenter et al. 2012). Thus, taking sleep episodes and spacing the relearning sessions has a beneficial impact on long-term memory and improves the durability and efficiency of learning.

2.3 Learning strategies, learning styles, and metacognition

As we learn, we develop certain patterns in information processing and application. Those patterns are referred to as “learning strategies” and “learning styles”. They are what make learning effective, as the brain creates automated approaches to the problem solving and information gathering. These two terms, however, are often mistakenly used interchangeably, that’s why the clarification is required.

A “learning strategy” is referred to as successful sequences and procedures that the learner selects to meet the needs of a specific situation (Nisbet & Schucksmith 1986, 6). In other words, a strategy is a method that the learner himself knows would work when applied to a new situation, and therefore it is used again and again, because it has proven effective before (Nisbet & Schucksmith 1986, 6, Sørensen 2017). Examples of the most common strategies can be found in Table 1. It turns out that most immature learning habits come primarily from learners not being able to plan, so, for a learning instructor, reinforcing the strategies that relate to planning improve the learning experience in the long run (Brown 1964).

Learning strategy	Action points
<i>Asking questions</i>	Define hypotheses Establish aims and parameters of a task Discover audience Relate tasks to previous work.
<i>Planning</i>	Become a top educator for dementia caregivers
<i>Monitoring</i>	Match efforts, answers and discoveries to initial questions & purposes
<i>Checking</i>	Preliminary assessment of performance and results

<i>Revising</i>	Set revised goals Re-calculating Re-drafting
<i>Self-testing</i>	Final self-assessment of results and performance on task

TABLE 1. A list of commonly mentioned strategies (Nisbet & Schucksmith 1986, 28)

However, if the learner is inclined to use the same learning strategy repeatedly, it means that there is a presence of a “learning style”. To be more precise, “learning style” is defined as ‘a stable consistency in one’s approach of learning’ (Schmeck 1988, 8-9). Learning strategies and styles are what make each learner unique when it comes to cognitive functioning; they are the intuitive processes that guide the learner through the procedures of acquiring new skills.

For long now, there’s been a belief among psychologists and instructors that certain people are inclined to be visual learners, and others kinaesthetic learners, and so forth. This has also lead to specific learning strategies and styles to be massively applied, even though there is no scientific proof towards them working better, which led to the huge amount of critique in the recent years.

Some learning designers would then aim to create a ‘one size fits all’ solution, where auditory, visual, and kinaesthetic learning styles are applied together (Neighmond 2011). Yet there is another way to address this, by making the strategies not person-based, but rather task-based. For instance, some tasks are better presented visually, which leads to each student performing better if that particular task is presented in such a way (Neilson 2017). In this manner, the new goal of a learning instructor would be to find the ideal way to present and deal with a specific type of information.

Another term that gives some clarity to the learning processes is “metacognition”. Invented by Flavell (1985), “metacognition” is described as one’s realization of having difficulty learning something new. The goal of a learner then becomes finding the source of difficulty and selecting a learning strategy to deal with it. This process, however, is deliberate, and the learner gets aware of it as opposed to the intuitive approach with learning

strategies and styles. Developing metacognition, and thus learning to face challenging situations in learning and finding working solutions, improves the application of knowledge, skills, and character qualities beyond the setting in which they were originally learnt. Consequently, this allows said qualities to become cross-disciplinary, which in turn makes them easier to apply in future situations. Lastly, metacognition is what helps the learner achieve higher levels of gains by developing a growth mindset, self-monitoring one's learning goals, and persistence in the face of difficulties (Fadel, Trilling & Bialik 2015).

Considering learning strategies, learning styles, and metacognition wisely when designing for learning would make the learning material more approachable for the learner and develop their learning habits, which all in all makes the learners perform better now and in the future.

2.4 Learning practices

Interleaved practice, even though it remains rather obscure in education, has been around for about 30 years. It is described as a mixed practice, where instead of deeply concentrating on one skill at a time (which is also known as “block practice”), it instead involves working on multiple skills in parallel.

For example, if the three topics to learn would be A, B, and C, instead of practicing in a traditional way - in a sequence of AAABBBCCC - interleaved practice blends it, making a sequence either ABCABCABC, or more randomized as ACBABCBA. According to a study performed by Rohrer & Taylor (2007), students that used interleaved practice performed 43% better during the test than those that used block practice.

Interleaved practice works best when learning complex skills, and enables a better retention as the learner revises all the topics over time. One important addition to interleaved practice is a spaced repetition that has been discussed in detail under the “The learning process” part of this thesis.

2.5 Rise of e-learning

As learning started to gradually move away from classrooms to take place digitally, the new digital media tools emerged. This led to the birth of e-learning, a type of learning conducted online or via electronic media. These digital tools allow for more customized learning, which causes the value of learning itself to increase. Students can use different pathways to understand new information, whether the material is given visually, textually, or gamified, which in turn makes the learning processes more universal. However, the biggest strength of e-learning is perhaps the fact that a learner can finally learn on his or her own, from any location or platform, and on their own established pace. (Neilson 2017).

Per contra, e-learning has a few major disadvantages. To start with, e-learning discards the supervisor, and with that timely feedback and role modelling become insufficient. Despite digital services generally being more precise with, for instance, feedback on time and precision, they can't easily replace the instructor. Moreover, e-learning is assumed to bring a lot less social experience than a traditional classroom could provide, and for this reason falls short on the human interaction side of learning (Neilson 2017). Last but not the least, e-learning as a form of informal education holds the challenge of applying knowledge in diverse contexts (Weigel, James & Gardner 2009). E-learning usually doesn't take real-time practice into consideration, which is worsened by services having poor tracking over the learners' successes and failures, thus making it hard for the learners to know how well they mastered the subject or skill, and how well they would be able to apply it in a real situation.

2.5.1 E-learning types

E-learning comes in two types: asynchronous and synchronous. The key characteristic of the asynchronous e-learning is that the learners and instructors are not online at the same time, which allows the students to work on their own pace, whereas synchronous e-learning happens when the learners and instructors interact with each other in the real time, making this way to learn more of a social experience. By comparison, synchronous e-

learning is closer to the traditional classroom learning in similarity than asynchronous learning (Clark 1999).

Some learning designers combine online and offline experience to create a hybrid that's been given the name of "blended learning". In blended learning, various learning methods and media get mixed together (Clark 1999). That's why it better accommodates various learning needs and supports a diverse audience (McSporrán & King 2005).

Blended learning speaks for itself when looking at the statistics. By average, blended learning platforms increase learning outcomes by 11% for both procedural (practical) and declarative (factual) knowledge (Sitzmann & Ely 2009). Additionally, asynchronous e-learning treats the person as a "lone learner", which often creates an attrition of as much as 20% drop-out rate. However, by making the learning blended, and putting a social aspect of the traditional classroom into use (for example, by utilizing social media), the lone-learning environment gets disrupted and the learners continue their learning journey (Clark 1999).

3 LEARNING EXPERIENCE

In the mid 90s, at the bloom of human-computer interaction, Donald Norman coined the term “user experience design” to describe a relationship between digital products and humans. Norman (1982) then emphasized the importance of putting user needs first. It was a ground-breaking approach at a time. In recent years, instructional designers have begun transitioning towards the same approach due to the abundance of data and a need to decode learning patterns. This resulted in a new field called learning experience (LX) design (Kilgore 2016).

The term “learning experience design” itself is believed to be coined by Connie Malamed in 2015 (IDF 2016). LX design is often described as a combination of many disciplines, including instructional design, educational pedagogy, neurosciences, social sciences, and UX/UI, to name a few.

3.1 Learning Experience design

There is a strong intertwining between User Experience (UX) design and Learning Experience (LX) design. Table 2 presents the design planes of UX & LX design. The levels go from abstract to concrete and are processed from bottom to top. The choices on each plane are constrained by the decision made on a level below them; the choices made on lower levels cause a “ripple effect” on the above layers (Garrett 2011, 22). It becomes obvious that each design process begins with identifying what needs solving and setting goals and objectives, which is followed by defining the content and logistics. The information and content architecture is thought out next, to ensure that the information is presented in a logical order to the user or learner. Further on, the means of interaction are built to ensure that the both user/learner is guided through the service smoothly, and that they can reach the content that they’re looking for. The final touch is given to the service by applying the brand’s tone of voice, look, and feel.

There are major differences between UX & LX design, however. As noted by Weigel (2015), a significant contrast lies in the transition from designing for a user to designing for a learner. Learners’ goals are generally more complex than users’ ones, that’s why a

good LX design is built in such a way that it helps mastering and retaining new information that is often challenging to comprehend. Besides, LX should be able to alleviate negative emotional responses that come forth in the process of learning, and turn them into an enjoyable experience instead.

Elements of LX design <i>Plaut (2014)</i>		Elements of UX design <i>Garrett (2011)</i>	
<i>Components</i>	<i>LX Planes</i>	<i>UX planes</i>	<i>Components</i>
Look and feel	<i>Sensory</i>	<i>Surface</i>	Look and feel Contents
Activities Lectures Assessment	<i>Interaction</i>	<i>Skeleton</i>	Interface Information design Navigation design Elements hierarchy
Learning requirements	<i>Structure</i>	<i>Structure</i>	Interaction design Information architecture
Content requirements Logistics	<i>Requirements</i>	<i>Scope</i>	Functional specification Content requirements
Needs and goals of the learner and the organisation	<i>Strategy</i>	<i>Strategy</i>	User needs Business goals

TABLE 2. Analysis of the LX & UX planes system based on Garrett's and Plaut's work (Kozina 2017)

The learning journey must be looked at carefully through the lens of cognition by the LX designer, to find an effective way of conveying information that a student can easily absorb (Neilson 2017). To avoid cognitive fatigue, LX designers should break down their material into short-term and long-term segments, and aim to find ways to simplify the information. This way, the material becomes more approachable, more natural and intuitive, and the entry barrier of the course lowers (Raymer 2011, Neilson 2017). Going down this funnel, the material should be broken down into modules, and from there into topics, and finally into objectives. This structure allows learners to master new skills gradually, and guides learners through a cycle of assessments (Raymer 2011).

Throughout the learning cycle, regular feedback is essential. When one studies with a present instructor, immediate real-time feedback is given to a student, and this is the aspect that digital educational services should maintain.

Learners' personal goals and individual traits are vital when it comes to learning experience design, primarily so because the learning experience aims to cultivate student engagement to keep the students up and running (Kilgore 2016). That's where LX meets service design, as the learning pathways, blueprints for checkpoints, class durations, and general infrastructure of the course are inspected.

However, no matter how well designed, LX may not be able to motivate the learner well enough, which then leads to the student dropping the course, or at least significantly lowers the learner's effort in learning. That's why, it's vital to develop the ways to engage students at the early stage of the design process.

3.1.1 The three types of learners

When intending to design new ways of learner engagement with the service, the type of learner must be defined first. The learner types are presented and broken down in the Table 3. The choice defines the approach with which the designer motivates the learner to continue. For example, adding gamification elements to the service would engage and motivate the strategic learner, whereas for the deep learners it may become a distraction. So, what defining the learner type really does is it allows a designer to select the appropriate engagement ways that would fit the target learner.

All in all, the educational e-services should be designed in such a way that they are approachable and friendly; the topic is presented in such a way that it is engaging, simple, and gives a certain sense of ownership to the user. Basically, it should be designed so that the learner would find it worth coming back to. When the motivation sparks, a learner will investigate a variety of subjects on his or her own. (Weigel, James & Gardner 2009, Neilson 2017, Sørensen 2017).

<i>Learner type</i>	Deep	Surface	Strategic
<i>Motivation</i>	Intrinsic	Extrinsic	Extrinsic
<i>Key characteristics</i>	Fascination Sense of relevance Sense of accomplishment Sense of calling	Meeting expectations of trusted role models Desire to avoid failure	Earning potential (rewards)
<i>Advantages</i>	Long-lasting motivation Self-sustention Focus on subject	Readily produced behaviour changes Little effort or preparation required No extensive knowledge required from the students	
<i>Disadvantages</i>	Slow process of fostering intrinsic motivation Special lengthy preparation is needed	Distract students from learning the subject Challenge in selecting appropriate methods Short-term effect Need to escalate the rewards and punishments over time to maintain a certain effect	
<i>Key drivers</i> <i>Piccioli 2014</i>	Acceptance Curiosity Honor Independence Order Power Social status	Fear of failure Fear of punishment	Recognition awards Performance goals Compensation increases Bonuses Collectibles Badges Points Rewards
<i>Flow state</i> <i>Csikszentmihályi, M. 1990</i>	Control Relaxation	Anxiety Worry	Apathy
<i>ARCS model</i> <i>Keller, J. 2010</i>	Confidence <i>Self-belief and growth</i> Satisfaction <i>Sense of achievement and usefulness</i>	Attention <i>Emotional connection and diversity</i> Relevance <i>Sense of self-development</i>	

TABLE 3. Learner type and individual motivators (Kozina 2017)

3.2 Student engagement & motivation

The term “motivation” is often referred to as a “want to” attitude, whereas “engagement” describes a “have to” attitude (Galloway 2016). That makes engagement an extrinsic behaviour, while motivation is a more established intrinsic behaviour. The assumption can be made that any type of engagement can convert into motivation over time.

There are three types of engagement defined by Fredricks et al. (2003):

1. *Behavioral engagement*: implies participation (involvement into academic and extracurricular activities)
2. *Emotional engagement*: implies emotional response (positive or negative reactions that result in stronger ties to the object of interest or willingness to accomplish more)
3. *Cognitive engagement*: implies mental investment (comprehending complex ideas and mastering difficult skills)

Extrinsic motivators are activated by a trigger of some sort, and the user or learner is constantly nudged towards undertaking an action. Eventually, with continuous application, extrinsic motivators turn into intrinsic ones – those that don’t need any external prompting, and tap into internal factors, such as drive to succeed or achieve a certain goal (Pappas 2016). Generally, extrinsic motivators have a lot less long-lasting effects than intrinsic do.

When we talk about designing for engagement or motivation, what we mean is designing a behavioral change for the users and learners. To start with, it implies that the designed experience must prove relevant to the learner, and hold resonating values. Then, the learner must be given a certain level of autonomy to be able to freely engage with the service at any desired moment and momentum, and reveal whether the service fulfils their expectations or not. When the learner can’t make sense of the sensory stimuli of the service or it’s other affordances, the experience becomes demotivating, and the learner drops out. So, to keep the engagement ongoing, the service designers should help the learner grasp the personal relevance of the product (Bisset & Lockton 2010, Piccioli 2014). If done well, engagement shifts from short-term to long-term, from extrinsic to intrinsic, gradually transforming into a reciprocal process - motivation.

Despite there being so many ways to engage and motivate the learners, there are three key methods that are widely applied today and bring great results to the learning services. Those are the use of gamification elements, developing a service personality, and building a habit-forming cycle.

3.2.1 Gamification

Developing a gamification strategy is one of the most obvious and commonly used ways to keep the learner engaged and motivated. The term “gamification” comes from the use of gameplay mechanics for non-game applications (Raymer 2011). Those mechanics are rewards, such as badges and points, to name a few, that are given to those who accomplish the desired tasks in order to positively reinforce the learners and fill the performance gaps (Pandey 2015, Pappas 2016).

The application of gamification strategies is very diverse. Some designers employ it to mimic the context and experience in which the new knowledge could be used, whereas others only apply it as a short-term motivator to engage a learner at the early stages of learning journey (Downes 2005, Hamari, Koivisto & Sarsa 2014). Certain positive patterns have been observed as the result of a “gameful” experience, including increased user activity, social interaction, and quality and productivity of actions (Hamari 2013, Pandey 2015). There are certain drawbacks in using gamification elements as well. In many cases, the learners struggle with the increased competition and task evaluation difficulties (Hamari, Koivisto & Sarsa 2014).

Even though in game design the designers are concentrating on the player types, this approach ends up irrelevant to designing LX. Rather, the LX designer should develop personas, with its own stories and demographics, which would be kept as a key target learner, and at which the designer can bounce new ideas to sort out what should be kept in the service and what should be left out.

Applying gamification

Despite it being quite easy to apply gamification elements to a service (without thoughtful consideration), there are a few essential points that should be dealt with. To start with, if the learner's skill exceeds the challenge of the experience, the learner will quickly get bored. Oppositely, if the challenge exceeds the learners' skill, the learner will suffer anxiety. Therefore, the learning curve should be designed proportionally, and so should be done with a reward system, too. The reward should match the risk and effort that was required from the learner. Moreover, this aspect should be rewarded separately. For instance, the reward should be given to those who take their time to go through supplementary material. Lastly, the rewards should be granted to the learner consistently through the learning journey, so that their motivation remains consistent. It works best if both momentary rewards (awarded upon completion of a task immediately, e.g. trophy) and persistent rewards (tracked and changing throughout the full journey, e.g. leader boards) are implemented to the e-learning service (Raymer 2011).

While many students would exclaim that making their learning experience gamified would make learning more productive, there are certain preferred gamification techniques; level progression, score system, and virtual currencies are highly rated. As for those that should be avoided, there are techniques such as competition, virtual gifts, and activity feeds (Pandey 2015).

Conclusion

Altogether, in an e-learning service, whenever gamified, the chosen strategies should suit the subject matters, needs of the audience, and learning objectives. Strictly speaking, the gamified elements should hold value (Pappas 2016). The gamified e-learning service shouldn't feel like a game. It should first and foremost aim to carry out the mission, no matter how playful it becomes, and follow the practices of the learning experience design (Neilson 2017).

3.2.2 Service personality

It's been usual for a digital product and the user to have a one-way communication, which didn't seem natural at all. As the services kept technologically developing and becoming more interactive, they finally got to a state where a real dialogue. However, something important was still missing: the digital products remained unpleasant to use. Then, the design organizations stood up globally, and figured out that most of the existing services were not human-oriented. In other words, they were missing a human touch that proved essential to anything created by us humans (Walter 2011).

Emotional design

One of the human-orientation design principles – emotional design – uses psychology and creativity to make digital service users feel like there is an actual person standing behind the operations of ‘the machine’, therefore establishing a clearer and more delightful dialogue between the user and the digital product itself. One way to achieve this is to develop what's referred to as a “service personality”. The service personality is known as the essence of the people who designed the service, and is built in such a way that their voice and perspective is represented in the interface - it is meant to build an emotional connection between the user and the service.

Simply put, emotional design's primary goal is to facilitate the human-to-human communication by creating an emotional bond between a user and an interface. As mentioned before, emotion and memory are closely linked, and thus the service builds on a positive memory and creates a long-lasting impression for the user, to the point of them staying with the service even if things go awry, which would have otherwise ended up with the users leaving the service (Walter 2011).

Building a service personality

There are multiple ways personality creation can be approached by a designer. To begin with, certain patterns are hard-wired through human development. These are proportions, rule of contrast, simplicity, Hick's law, Gestalt's Law of Prägnanz, etc. These design

principles build a basis for emotional design because of their strong connectedness to the cognitive ability of the brain.

However, the biggest step to designing a service personality is to define a design persona. This is a step-by-step process that includes defining the unique features of the personality that the service should convey, listing brand traits that fit best and those that should be avoided, setting the tone of voice, and developing the visual lexicon of the service. Most importantly, the personality image must be created, which can be inspired either by the company's mascot or a real person from the team, whose personal traits are embodied into the brand. A personality map helps to define how friendly or dominant the service personality should be. Lastly, based on the previous steps, the designer can develop the engagement methods that best fit the created personality (Walter 2011).

In the past few years, storytelling and the use of humour started gaining its' popularity in service design. This informal approach makes the audience feel more comfortable when "onboarding" to the service, and even makes them feel more supported. The humorous attitude helps the users complete long complicated tasks, which makes it a good approach for LX design as well.

Conclusion

While many services still exist to serve a specific function, others are designed to please the user through the provided experience. Creating a more "humanized" version of a service doesn't only create more amicable atmosphere, but also helps organize users, as those that don't correlate with the created personality are most likely not the desired customers (Walter 2011). All in all, building a service personality makes the service more approachable, which makes the users more loyal towards the service in return.

3.2.3 Habit-forming cycle

As technologies become an essential part of our lives, one observation can be made: we are all hooked to our owned devices and services. On average, people check their phones about 34 times a day (Eyal 2014). This attachment is nothing but an engineered behavior

that's been thought through by the product designers. Since the e-learning services' creators often struggle to keep the users engaged and learning without interruption, why not just hook the learner and make a habit out of the whole learning experience?

The theory

As Nir Eyal (2014) stated in his book, habit-forming is an imperative advantage for the survival of many products nowadays, as it brings tremendous value and a competitive advantage to the companies. As a result of the successful implementation of the habit-forming cycle, users show up due to their internal prompting, daily routines, and emotions.

The habit

Before the cycle building process is introduced, however, it's worth clarifying why habits are so powerful in the first place. The habit is described as "automatic behaviour triggered by situational cues", or simply put, the habit is something we do with little or no conscious thought. Habits are built consequently over time as the brain learns how to deal with a complex behavior. It's a mechanism that helps us act quickly in new situations. That's exactly the reason why habits are so hard to "kill" or change. Therefore, once the habit with a service is established, the user keeps coming back to continue engaging.

For a habit to occur, there are two factors to be met: the behavior must occur frequently and it must hold a certain value to the user (Figure 1). However, frequency is key here, because the habit-forming potential lowers drastically if the behavior is too infrequent – it'll stay a conscious activity and never turn into an automatic response (Eyal 2014).

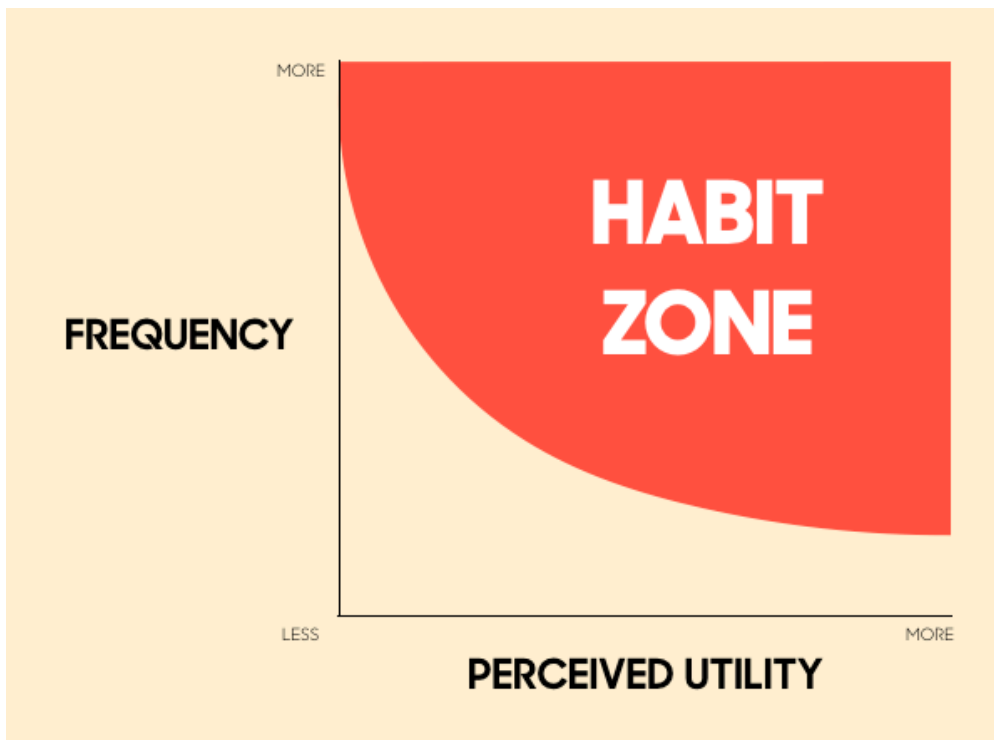


FIGURE 1. Habit forming factors: frequency and perceived utility (Kozina 2016)

The hook model

The habit-forming cycle, also referred to as the “hook model”, is designed in four segments: Trigger, Action, Variable Reward, and Investment (Figure 2).

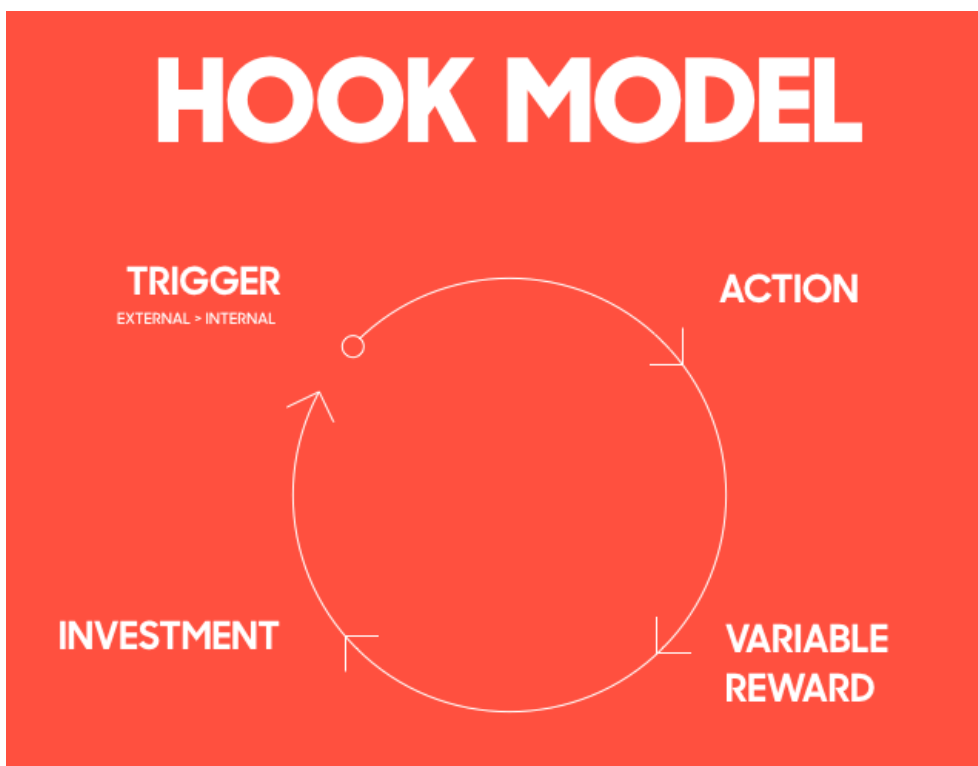


FIGURE 2. The structure of the habit-forming cycle, or hook model (Kozina 2016)

Trigger

Trigger is a call to action that comes in different shapes, such as an advertisement, “Likes” on Facebook post, or even just as the app icon on a device. It intrigues the person and nudges them to act. Every trigger starts as external, which after a repetitive cycling attaches to the behaviors and emotions and eventually becomes internal. So, the intent of the trigger is basically to reduce external prompting to interact with the service and turn it into an internal urge (Eyal 2014). Once connected, the behavior becomes automatic, and is linked directly to the sense of relief. For example, when people feel uncertain about something, they search for answers on Google. Similarly, if people feel lonely, they turn to social media channels, e.g. Facebook or Twitter. These are the examples of learnt behaviors that turned into habits.

Action

The next step in the model is Action. Action can be defined as a behavior done in anticipation of reward (Eyal 2014). The formula $B=MAT$ is often used to design an action, where B stands for Behavior (as a synonym to “action”), M for motivation, A for ability, and T for trigger. All three of the ingredients have to be present at the same time. For instance, if a person hears the phone call (trigger), and he or she would happily pick it up (motivation), but the phone is buried deep in the bag, chances are the behavior won’t occur due to the ability being restrained.

The ability is by far the hardest element to comply with, because it’s linked to such factors as time, money, and physical and mental effort. That’s why, to make sure that the ability is encouraged, the service should be designed with a principle of simplicity in mind, so that no additional effort is required by the user (Eyal 2014). To sum up, the action is implemented to engage people and make them anticipate the reward, which leads to the next element of the hook model.

Variable Reward

Variable Reward is known to be one of the most effective ways to hook users. In the core of it is rewarding the user with something different throughout the process of using the service. Regardless, scientists have misunderstood rewards wrongly for a long time - it turns out that we experience pleasure (due to a dopamine surge) not when receiving the reward, but rather in anticipation of it (Eyal 2014). That's why the Action and Variable Reward parts of the hook model are closely connected. So, for the same reason, what makes the Variable Reward stage so powerful is its' ability to alleviate the craving for the reward, and start expecting a new one.

The reward should stay variable, because it creates a sense of surprise and intrigues the users to get to know what they may receive next. That's why rewards naturally come in three types: of the tribe, of the hunt, and of the self. Tribe rewards are driven by the connectedness with people and social validation, so it's primarily applied in social media platform design. The rewards of the hunt are hard-wired in us as we used to hunt down our food, and has now transformed into seeking new experiences – one can't know what will be discovered next. Lastly, the reward of the self is driven by a deep intrinsic motivation, that's linked to the sense of achievement and task completion (Eyal 2014).

By keeping the rewards variable, the designer can ensure that the user stays excited long-term when using the service.

Investment

Lastly, the model includes the Investment stage. As the user adds more personal data to the service, he or she adds more value, which in turn brings the user back to the service in the future. Investment comes in many shapes: it can be the content, data, acquired auditory, reputation, or skill (Eyal 2014).

Conclusion

All things considered, the habit-forming cycle is a powerful tool in the hands of a designer. It is, however, also considered a manipulative model, so it should be used thoughtfully and with good intentions. Despite this, due to people using multiple connected devices, it's increasing the ability of companies to affect the user's behavior. The companies are now able to access and analyze customer data through the various channels and mediums.

3.3 Omnichannel experience

Modern technologies have made the world closer and more connected than ever before. These days, people rarely have only one device, and therefore, ideally, their accounts stay synched on every device, through every channel that they're connected to, so that the user can access each service whenever necessary. As a result, user data must stay consistent through the media (the means of communication, e.g. written text), channels (a transmission tool, e.g. online), platforms (a computer architecture, system, or software, e.g. Facebook), and devices (a piece of equipment, e.g. smartphone).

As the technological landscape is ever-changing, it's not enough to pick a channel and create a great experience for it. Instead, the experience is approached holistically, with the data being available universally, no matter which touchpoint the user chooses to interact with (Bluestone 2015, Flaherty 2016). The designed experiences, must be equally rewarding to all users.

This phenomenon of the users' ability to interact with the content across different channels and platforms has been named the "omnichannel experience". With it, the role of the UX and LX professionals have shifted its focus to both online and offline channels, even considering how the channels themselves interact. For instance, if a user started a purchasing process on one channel and had to pause the activity, he or she should be able to resume it at a later point from an alternative touchpoint (Bluestone 2015).

3.3.1 Omni-channel experience implementation

While designing an omnichannel experience may be hard to implement, as it requires more design and development work, it has a couple fantastic benefits. First of all, the consistent experience builds familiarity and confidence when using the omnichannel service. Secondly, the omnichannel services are generally easier to learn, as the intractability is kept the same. Thirdly, the users complete the tasks faster and more efficiently as it can be done in any possible context or touchpoint. Fourthly, and lastly, the omni-channel services quickly gain trust, because the users start finding the service credible and shares it with others (Flaherty 2016).

However, aiming for this consistency has certain restraints as well. The consistency doesn't only apply to the channels, but must also apply to the individual interface design guidelines. With the diversity of operating systems (e.g. Mac OS, Windows) and mobile clients (e.g. iOS, Android, Windows), one of the main struggles for developers and designers is to keep the interactivity patterns similar to what the systems support. This doesn't only pertain to the user-product interaction, but also to the interface itself. As an example, iOS users are used to the menu tab being on the bottom of their smartphone screen, whilst Android users expect it to be on top. While this doesn't seem to be a significant matter, any changes to the navigation, to which the users are familiar with, makes the users terribly confused. Therefore, even though omnichannel experiences may seem like an attractive approach, it should go through a separate round of assessments and be considered with care.

3.4 Preliminary Learning Experience Design Principles

According to the above-mentioned theoretical research, LX design has been proven to be a holistic approach that is built with the collected clues from neuroscience, cognitive psychology, design thinking, service design, and UX design.

A successful LX is the one that adds to memory retention, raises learning engagement levels, encourages the use of the modern technologies and tools, and finally, supports the individual traits of the learners in the direction of bettering themselves with newly acquired knowledge.

To design an effective and enjoyable LX, the following principles must be met:

1. The class duration is kept under 20 minutes at a time, to boost learner's focus;
2. Multiple senses (e.g. auditory, visual, tactile, and kinaesthetic) are used in the learning process;
3. The learner goes through a personalization cycle to define current knowledge level and to set learning goals;
4. Spacing effect (a gap of rest – sleeping episode - between the learning and re-learning sessions) is implemented to boost memory retention;
5. Interleaved practice takes place within the learning process;
6. The aspects of blended learning are implemented in learning;
7. The learning applies, or is directly set in a social environment;
8. The learner is given timely feedback during the learning process;
9. The learner goes through the round of relevant checkpoints (e.g. tasks), that are implemented in accordance with the spacing gap;
10. The habit-forming cycle is applied to “hook” learners to the learning platform, and turns their external prompting to learn into an internal one;
11. Gamification techniques are used to raise motivation in learners;
12. Elements of the emotional design are applied to the service;
13. The principles of omnichannel experience are applied to support the human behaviour towards information consistency.

3.4.1 Analysis of e-learning services

In the interest of understanding whether the above-mentioned principles have a place to be, and whether the market nowadays meets these principles, an extensive analysis on the existing e-learning services have been conducted (Appendix 5).

The body of the analysis consists of 13 online digital educational platforms, sorted out by approaches to their UX, UI, material presentation, motivation of the learner, and support of learners' individual traits. The results have been reflected with the LX Principles, and outlined in Table 4.

Platform name	Yousician	Google Primer	Headspace	Memrise	Udemy	NovoEd	Duolingo	Lynda	TED talks	Envato tuts+	Babbel	Coursera	PerfectEar
Class duration < 20 min	x	x	x	x	x		x	x			x		x
Emotional design elements	x	x	x	x			x				x		
Use of multiple senses	x	x	x	x			x				x		x
Personalization	x							x	x	x	x	x	
Space effect	x	x	x	x		x	x	x			x	x	
Interleaved practice	x	x	x	x	x		x	x	x	x	x		x
Blended learning	x	x	x	x	x		x	x	x	x	x		x
Social learning	x		x			x					x		
Feedback loops	x			x		x	x				x		x
Assessment rounds	x	x		x		x	x	x			x	x	x
Gamification	x		x	x			x						
Habit-forming cycle	x		x	x			x	x			x		
Omni-channel experience	x		x	x	x		x	x	x		x	x	
Total (% of resemblance)	100	53	76	84	30	30	84	61	30	23	92	30	46

TABLE 4. Online digital educational platforms' analysis of the application of LX Principles (Kozina 2017)

As presented in the analysis, Yousician and Babbel fit the predefined LX Principles the most. The following three – Headspace, Memrise, and Duolingo – have also scored high in the analysis. It is worth mentioning that all these services are topic specific, either teaching its learners to play musical instruments, speak different languages, or meditate.

Presumably, the best LX can be achieved only by taking the final learning goal into consideration, with approaches to different services varying significantly, yet having certain similarities in design process. For instance, Yousician aims to teach people to play musical instruments, therefore designing learning paths and considering all the learner types in a way that fulfils their learning potential by leading them towards mastering music. As opposed to subject-specific e-learning service, those that concentrate on multiple topics at once suffer from not delivering a unique pathway to mastering a specific topic or skill. For instance, Coursera would constraint the instructors that teach Design Thinking with

the same material presentation tools as teaching Coding with Python, which is a wrong approach by all means.

The preceding analysis has verified that the defined LX Principles are applied to e-learning services currently, and most certainly define what the modern understanding of successful e-learning is, by making the learning process both enjoyable and learner-centred.

4 CASE STUDY

4.1 Introduction to Memocate

Memocate is a young spin-off company from the University of Helsinki, Finland. Established in Spring 2017, and it employs 10 international team members. Memocate aims to provide digital educational services for dementia caregivers, based on a high-quality academic research delivered by Camilla Lindholm, one of the company founders, and linguistics professor and researcher from University of Helsinki. By achieving their goal, Memocate services aim to improve the quality of caregiving, by providing most the recent insights on interaction and communication with people with dementia.

In addition, Memocate is a pioneering product in the field of dementia education. In contrast to the information banks that are available on websites, there is no service that delivers the material on this subject in a learner-centered way and accommodates the learner's goals and needs.

Memocate has recently acquired its first client. Therefore, the team is currently developing its pilot service that will be made public by 2018. This will be a Minimum Viable Product (MVP) version of the e-learning service, that will cover basic educational features and approaches of the product. The MVP will consist of the first three courses.

4.2 Research on the target user

Memocate aims to accommodate the needs of both family caregivers (FCG) as well as professional caregivers (PCG). This on its own causes a rather big design challenge, since the ways both groups learn as well as their learning goals differ significantly.

The key to understanding of the users, as well as their desires and problems, lies in first and foremost a proper user research. In support of this thesis, a deeper understanding on learning problems of the caregivers has been acquired via surveys.

In total, three surveys and one separate interview session have been performed: one survey aiming to reveal people's learning routines and habits (Appendix 6, 9); and two surveys that concentrated on dementia caregivers, both PCG and FCG, and their struggles and needs in caregiving (Appendices 7, 8, 9). Additionally, insights from the interviews with PCG have been provided to complete the research picture (Appendix 10).

4.2.1 Quantitative and qualitative research on dementia caregivers

A quantitative research on dementia caregiving was conducted to reveal the needs of the caregivers who frequently interact with people with dementia (PWD).

The link to the survey was posted in multiple Facebook caregiver communities, such as Dementia Support, Intensive Interaction in Dementia, and 6 other. As mentioned previously, caregivers can be both professional (e.g. nurses) and family (e.g. relatives of PWD). Due to most of the answers coming from FCG, another survey was launched, targeting exclusively PCG, and sent off to nursing homes.

As for the qualitative research, interviews with PCGs were done in multiple Finnish nursing homes, including Kontukoti and Villa Tapiola.

The key insights from the research and analysis, together with the similarities and differences of both caregiver groups are presented in Table 5. The analysis suggests that FCG and PCG, even though united by caring for PWD, have entirely different frustrations and motivations. Therefore, Memocate's LX must be designed in a way that it addresses the individual needs and traits of both groups.

<i>Caregiver type</i>	Professional (PCG)	Family (FCG)
<i>Age group</i>	25-44	45-64
<i>Gender</i>	Female	Female
<i>Common traits</i>	Good work-life balance Work is done in a hurry Eager to learn more & develop as a professional Not very familiar with e-learning	Bad work-life balance Feel stressed & tired Feel lonely & unsupported General lack of time for self-development
<i>Interaction with PWD</i>	Daily basis	Daily basis
<i>Key struggles</i>	Mood swings of PWD Inability to understand PWD's needs Inability to clearly communicate with PWD Daily routine with PWD PWD not accepting his condition	Mood swings of PWD Inability to understand PWD's needs Inability to creatively interact with PWD Lack of understanding in the community Need of respite
<i>Main help channels</i>	Live community Online search	Online community Online search Scientific papers

TABLE 5. Analysis of the survey results of PCGs and FCGs (Kozina 2017).

4.2.2 Quantitative research on learning

Quantitative research on learning aimed to reveal how people prefer to learn, how much time they invest in learning, and what learning techniques they find effective. The goal of this research was to reveal habitual and behavioural patterns in learning preferences of different age groups, and utilize this knowledge to complete caregiver profiles.

Appendix 9 provides an overview of the learning patterns per age group. However, to make the LX suitable for Memocate's target users, the above-mentioned findings are applied to caregiver profiles to determine the learning preferences of the users (Table 6).

<i>Caregiver type</i>	Professional (PCG)	Family (FCG)
<i>Age group</i>	25-44	45-64
<i>Time dedicated to self-development</i>	2 hours / day	< 30 minutes / day
<i>Preferred learning styles</i>	Reading Visual display Audio-visual display Repetition	Reading Audio-visual display
<i>E-learning type preference</i>	Blended	Blended
<i>Key advantages of e-learning</i>	Flexibility in time Self-established pace Low costs Instant feedback Variety of content	Flexibility in time Self-established pace Instant feedback
<i>E-learning service choice criteria</i>	Quality of the material Relevancy of assignments Service & visual design	Quality of the material
<i>Estimated time for e-learning</i>	< 15 minutes / day	< 30 minutes / day
<i>Technology use level</i>	Expert	Expert

TABLE 6. Analysis of the learning preferences per caregiver type, to design suitable learning experience for Memocate (Kozina 2017).

All in all, PCG has more diverse learning preferences than FCG. There are, however, enough similarities to work with. Most of all, the results show that the target audience's preferences match those of the LX principles defined in the previous chapter - therefore it is important to remember that the learning sessions must stay under the restricted time duration. Additionally, it is of importance that users find the learning material useful and purposeful. Lastly, the traits of blended learning must be implemented (e.g. guidance, feedback, and socialization), along with giving a learner time to study on their own.

4.2.3 General research findings

A few general observations came forth in the analysis of learning preferences (Appendix 9) that differ in correspondence to the learner demographics, such as:

1. The caregivers are primarily female individuals;
2. Men invest more time in self-development and learning than women;
3. People invest less time in self-development and learning as they get older;
4. Women crave for guidance when learning, whereas men prefer being challenged;
5. Men consider themselves more at ease with modern technologies than women;
6. Europeans are more concerned with a look of the digital services than non-Europeans;
7. The more time one spends commuting, the more he/she prefers self-learning;
8. The more time one spends e-learning, the less likely it is he/she has a preference for a traditional classroom style of learning;
9. The more time one spends learning, the more he/she appreciates additional engagement methods;
10. Learners dislike online lectures the most out of the available types of material presentation;
11. As an incidental, people's preference to learn with a present instructor or on their own is purely individual; there were no links or patterns observed via the analysis.

4.3 Minimum Viable Product

By the year 2018, the first-ever Memocate pilot will be out and tested by the first client, Municipality of Sipoo, and by nursing homes, Kontukoti and Villa Tapiola. Therefore, for the sake of this thesis project, the design process will be described from the perspective of developing Memocate's MVP (Minimum Viable Product).

Nevertheless, there is a bigger picture to the service. As the Design Director and Service Designer of Memocate, I've facilitated a Lean Service Creation (LSC) workshop for the team at the start of our working process. LSC is an open-source toolkit created by Futurece, a company that covers all aspects of digital services' creation. It consists of a set of canvases that bring the team together to innovate, reflect, and rediscover the potential of their product. Each canvas represents a new phase of the process

By the end of the workshop, we defined Memocate's business problem and goal, data needs, user segments, and customer problems. As a result, we were able to conclude the concept and value proposition (Table 7). This was the first time we discovered what the product might be able to be.

Later, as more user research was gathered and more insights were available, I went through the Ideation phase of LSC. Ideation starts with defining the user problems, and their negative and positive emotions attached to those problems. Then, I brainstormed the solutions that would crack the key problem, ease the pain of the negative emotions, and help embrace the positive ones.

As a result, 54 ideas for new service features sparked up, some related to PCG, others to FCG, or both. The ideas were then grouped into categories (e.g. community & support, stress reliever, management, learning), and the team voted on features that should take a part of the MVP (Table 8). However, features will constantly be iterated on. to maintain Memocate's lean development - with future plans for more features and items.

LSC step	Decision
<i>Business problem</i>	How to educate caregivers on recent research on dementia? How to acquire profit with our product?
<i>Our goal</i>	Become a top educator for dementia caregivers
<i>Data needs</i>	Do our choices fit to users' demographics? Is our product usable and easy to learn with? Is the pricing affordable to our users?
<i>Customer problem</i>	Get cheap education about dementia caregiving Learn about communication and interaction with PWD, to improve their own performance
<i>Customer segments</i>	Family caregiver Professional caregiver Volunteers* <i>*supplementary group, not a main segment</i>
<i>Value proposition</i>	Memocate - Aid for dementia We believe that proper human-to-human interaction is the key to quality care. Memocate educates its users, dementia caregivers, how to cope with dementia. This educational online service covers various learning methods & brings a comprehensive and engaging Learning Experience.
<i>Key points</i>	Interaction as a communication tool (scientific research) Online service (available anytime) Comprehensive educational material Community support

TABLE 7. LSC workshop results (Kozina 2017).

Category	Feature
<i>Community & support</i>	Online community / forum Social up-vote
<i>Stories</i>	Personal story writing Case study * <i>* for PCG only</i>
<i>Call to action (CTA)</i>	Regular newsfeed Learning streak
<i>Learning</i>	Text material Animation (intro to the module) Content type signifiers Ability to resume Learning content rating Text highlighter Transcription of animation material Support fluidity of the content

TABLE 8. Memocate MVP features list (Kozina 2017).

4.3.1 Memocate Brand & Service Personality

A brand is the unique story that consumers recall when they think of a specific product; it represents a particular personality, solution to a problem, and position relative to the competitors of the product. Brand was beautifully described by Laura Busche (2015) as “a bridge between who your consumers are and who they want to be”.

Brand Vision workshop

To build a brand for Memocate, I facilitated a Brand Vision workshop for the team in June 2017. During the workshop, we went through multiple canvases, that in the end concluded Memocate's Minimum Viable Brand. This was done to build temporary iterable value metrics that we believe resonate with our audience. Additionally, the workshop gave us the Brand Traits, defining the brand's personality, language, tone of voice, and key Brand Values. We also did a few "gut feeling" exercises (intuitive exercises), e.g. matching brand traits with certain colours and the look of the existing e-learning services (Image 1).

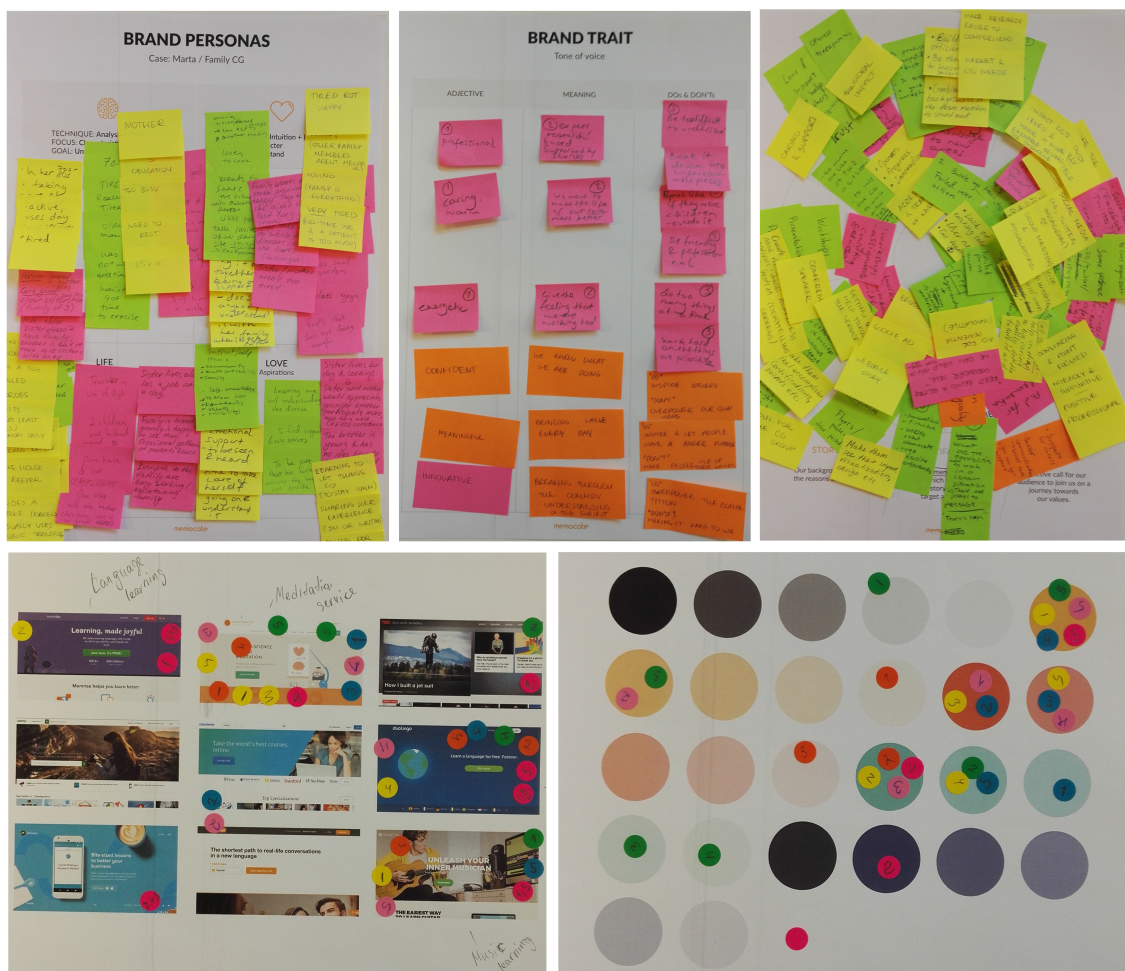


IMAGE 1. Pictures taken during the Brand Vision Workshop (Kozina 2017)

The most important discovery of the workshop – the key Brand Values – are presented in Table 9. They will be used extensively in Memocate’s our design, marketing, and business planning. Also, the brand obviously will stay lean and iterated periodically, to keep resonating with its audiences.

Brand value	Sub-value	Meaning
<i>Innovative</i>	Meaningful	We break through the common understanding of the subject
<i>Professional</i>	Trustworthy	Clarity in information and reliable sources are at the core of our product
<i>Caring</i>	Optimistic Understanding	We believe in people and their ability to make their own lives better
<i>Simple</i>	Approachable Straightforward in design	No confusion caused by design or material; all service elements are purposeful
<i>Collaborative</i>	Built for people	Allowing people to grow together and help each other

TABLE 9. Memocate Brand Values defined during the workshop (Kozina 2017)

Developing a Service Personality

In the Service Personality part of the thesis (in chapters 2.3.2 and 3.3.3), it was discussed how emotional design transforms digital services, and makes them more human-oriented and delightful to use. With the Brand Values established, it is time to define Memocate’s Service Personality (Table 10).

Image 2 embodies the service personality into a mascot that will be used further on across the service screens.

Criterion	Description
<i>Brand name</i>	Memocate
<i>Overview</i>	<p>Cate Memorie is the face of Memocate’s personality. Cate’s cheerful posture invites people to join her on a learning adventure, and her geometrically-built frame represents the service’s brand and design traits.</p> <p>Her roundness and ever-smiling face bring users support and guidance. Despite the cartoon-ish and colourful style hinting towards the informal experience that Memocate provides, she is a nurse, professional and convincing – the traits that stand for our study material.</p>
<i>Brand traits</i>	<p>Optimistic <i>but not bizarre</i></p> <p>Simple <i>but not simplistic</i></p> <p>Trustworthy <i>but not pedantic</i></p> <p>Meaningful <i>but not intricate</i></p> <p>Friendly <i>but not superfluous</i></p>
<i>Personality map</i>	<p>Dominant ○ ● ○ ○ ○ Submissive</p> <p>Friendly ● ○ ○ ○ ○ Distant</p>
<i>Tone of voice</i>	<p>Memocate’s voice is humane and warm. It sparks support and trust in the users from the very start. It turns humorous to help users through complicated educational material and tasks.</p> <p>Yet, if something goes wrong in the service, the voice is cool and confident. It states things laconically, with a tad of optimism in the voice.</p> <p>Cate loves sharing stories, and often comes by when no interaction happens for a while. Then, the voice is homey and empathetic. It reflects the user’s emotions and adapts to bring a positive experience.</p>
<i>Copy example</i>	<p><i>Success message:</i> “Impressive work! You just nailed yet another topic.”</p> <p><i>Failure message:</i> “We’re currently reviewing our systems. Our team will get things back to normal shortly.”</p>
<i>Visual lexicon</i>	<p><i>Colours:</i> The colour scheme conveys Memocate’s key brand values</p> <p><i>Typography:</i> Memocate is easy-going, supportive, and usable. It’s typeface, Lato, reflects this through its attributes; sans serif,</p>

round, and simple, it varies with the message, and communicates information hierarchy with the change of colour, weight, and style

General style: Memocate’s service is direct, easy-to-use, and modern. This is achieved with the use of simple flat shapes. Yet, it grabs attention and arouses positive emotions through its voice

Engagement method *Surprise:* Cate remembers the seasons, and “dresses” the service up for the upcoming events. The changes are unexpected and memorable

Curiosity: On a weekly basis, users get a Catemail, where she shares the up-to-date research and blogposts on the most frequently brought up topics related to dementia

Learning power: Cate suggests which learning path is best suited for the learner

TABLE 10. Memocate’s Service Personality Overview (Kozina 2017)



IMAGE 2. Memocate’s mascot and personality image, Cate Memorie (Kozina 2017)

4.3.2 Service design

Service design aims to organize infrastructure and material elements of a service, to build an interaction between the user and the service provider. It should be planned holistically, putting user needs first, and thinking ahead of time. There are two key tools used in service design: personas and user journeys.

Personas

Personas are fictional characters created to embody specific key characteristics of the target user groups. Personas are used throughout the design process in developing service user cases, as well as for bouncing off new ideas. They are often given a background story which brings together their demographics, psychographics, and aspirations. Mainly, however, personas sum up the target group profile in an easy-to-consume infographic. Memocate's target groups are FCG and PCG. Their profiles went through a round of assumptions during the Brand Vision workshop, which helped to come up with a unique story for each target group (Figures 3, 4).



Marta is a loving wife. Her husband, Rick, was struck with Alzheimer half a year ago. Despite the forthcoming changes, Marta kept her job position, and additionally takes care of her partner. Her life is tiring, and she is barely coping.

Marta Sallinen

FAMILY CAREGIVER

GENDER

Female

AGE

60 y.o.

OCCUPATION

Elementary school tutor

STATUS

Married

CHILDREN

2 adult children

OTHER

Has a dog Bran



KEY STRUGGLES

Inability to fully understand her husband's needs
 Little knowledge on dementia and related procedures
 Need of respite and support
 Not enough understanding in family and community



ASPIRATIONS

Seeks external help and support to relieve stress
Memocate connects Marta to single-minded people
 Learns more about dementia
Memocate educates Marta on communication and interaction with PWD
 Intends to lighten her load
Memocate helps organise Marta's affairs with her family



COMMON TRAITS

Feels lonely and misunderstood
 Very loving towards her family
 Perfectionism drives her to deliver the best care
 Communicative and friendly
 Very tired from her load
 Active in discovering new activities for her husband
 Hobbies keep her going
 Escapes from reality with fantasy books and movies

FIGURE 3. Persona of the Family Caregiver (FCG) (Kozina 2017).



Linda chose to dedicate her life to doing good. She never stops learning, and can often be found with a non-fiction book in hand. Linda knows how to manage her time: she is a dedicated professional at work, and a loving mother and wife at home.

Linda Kokkola

PROFESSIONAL CAREGIVER

GENDER

Female

AGE

30 y.o.

OCCUPATION

Practical nurse

STATUS

Married

CHILDREN

1,5 y.o. boy

OTHER

Has a cat Pop



KEY STRUGGLES

Inability to fully understand her patients' needs
Learning isn't well supported at work
Work duties are done in a constant hurry



ASPIRATIONS

Keen on learning and self-evolving
Memocate educates Linda on communication and interaction with PWD
Seeks acknowledgment for her work
Memocate makes makes her stand out and be rewarded online
Knows her patients as well as the back of her hand
Memocate helps Linda to keep her online diary, and makes her stories and progress visible



COMMON TRAITS

Curiosity driven and eager to learn
Confident in her strengths and aspirations
Feels purposeful with her work
Motivated to become a better medical professional
Hobbies help her unwind
Loves being surprised
Easily copes with stress

FIGURE 4. Persona of the Professional Caregiver (PCG) (Kozina 2017).

User journey

The user journey is a visual representation of how a customer or user experiences a service over time. The goal of the user journey is to identify the touchpoints – the moments when the user feels a need to interact, or directly make use of the different aspects of a service.

When creating the user journey for Memocate, I noticed that the journey of FCG and PCG became one continuous process; the journey started with FCG, but as their PWD entered the care home, PCG took over. Besides this, there were a few other points where FCG got into direct contact with PCG (Figures 5, 6).



USER JOURNEY

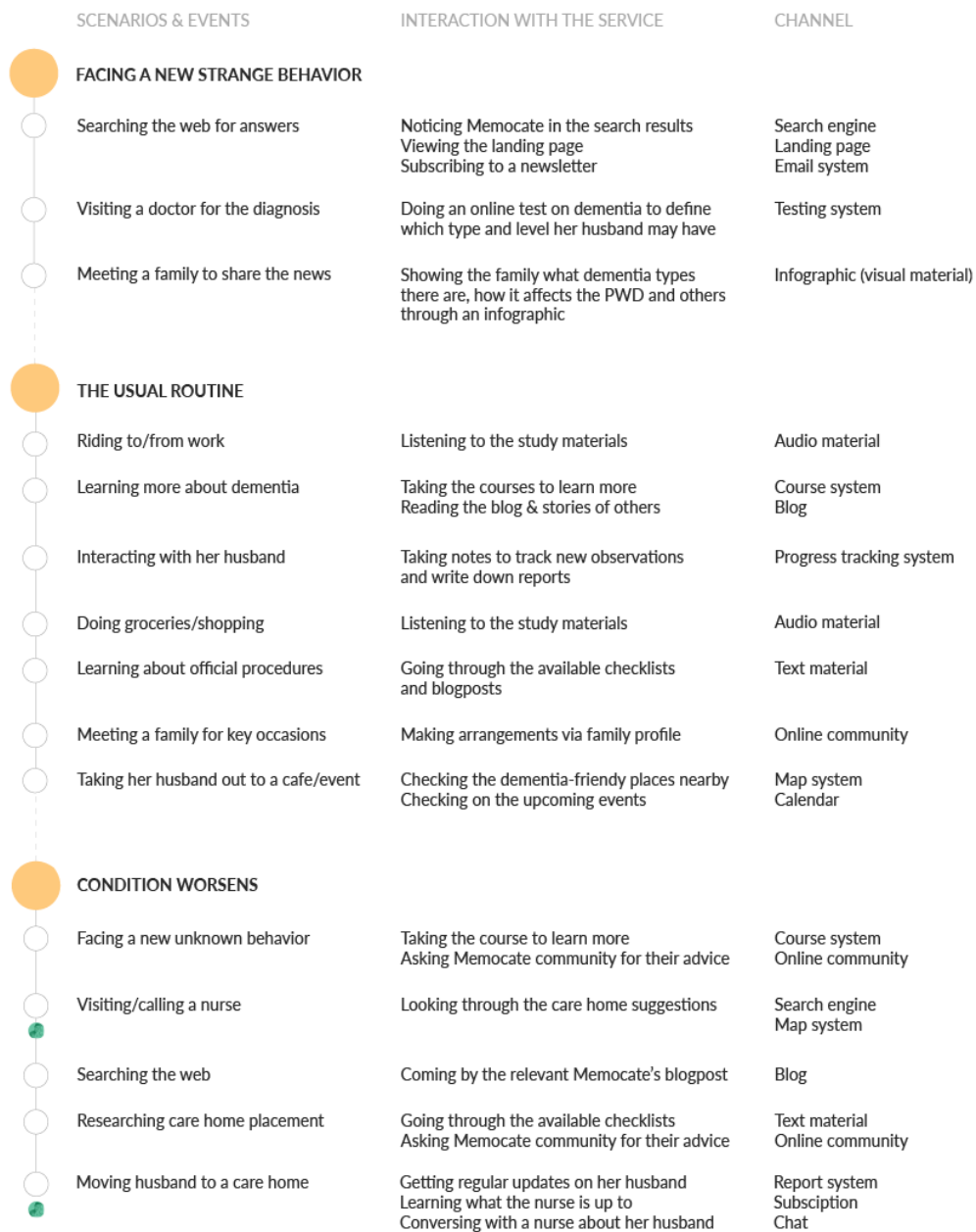
Marta struggles when dealing with the new state of her husband

FIGURE 5. User journey of a Family Caregiver (FCG) (Kozina 2017).

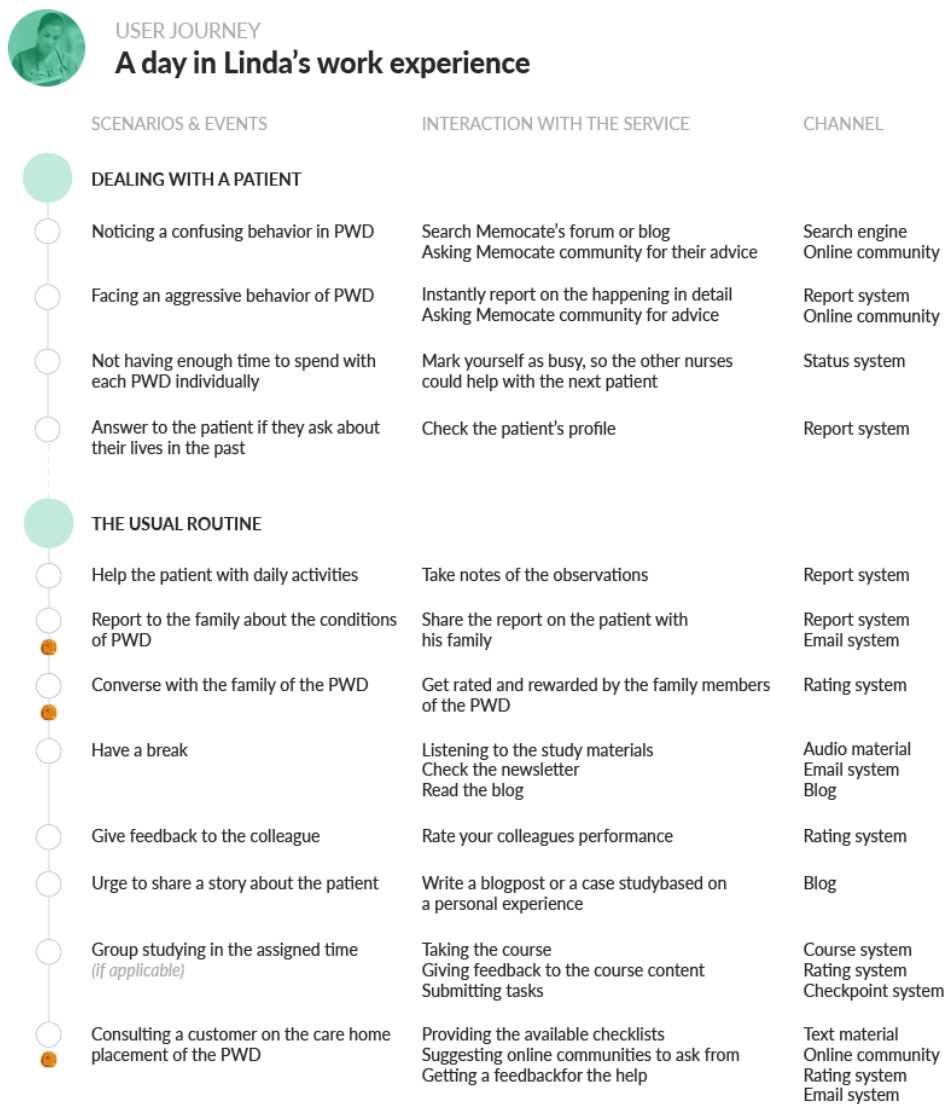


FIGURE 6. User journey of a Professional Caregiver (PCG) (Kozina 2017).

4.3.3 Learning paths and engagement

In the Learning Experience section (chapter 2) of this thesis, the planes of LX design were introduced. Up until this point, the thesis project has focused on the Strategy plane, with its research and investigations, as well as the Requirements plane, with its service design and brand. However, it is now time to move towards the Structure plane of the LX design process - which focusses on the flow of the learning experience.

As presented before, there are three types of learners: Deep, Surface, and Strategic learners. There are services that (unwittingly) aim to cover only one specific type of learner.

These services therefore miss out on potential users who simply did not find the e-learning service useful. Since Memocate's target users are rather diverse, it is one of our goals to accommodate all the learner types. Therefore, multiple learning paths have been created.

Path 1 is an Individualized learning path (Table 11). The learner's past knowledge and his goal stay at the core of this path. It aims to guide the user directly to getting better at a specific area of caregiving, or mastering a specific skill. This path is best suited for FCG, due to its guiding aspect. Also, the path brings no unnecessary stress to the user; there are no tests and checkpoints, and the user is to analyse his/her own progress, and learn from it.

PATH 1: INDIVIDUALIZED LEARNING

Learning objectives
Anderson et al. (2001)

Understand / Apply / Analyse

Structure

Assessment round

Identify the knowledge & skill level (mastery) of the learner

Setting the goal

What is the learner's main aim in this course? (e.g. gaining confidence, understanding dementia, cover the basics, etc.)

Learning blocks

There are 10-15 pre-arranged classes, up to 20 min long, that will be presented to the learner

Classes

Animations that sums up the topic (with transcription); Study material (text and/or audio); Case Studies attached, if applicable

Action

After the class, a learner gets a few practical points that need to be practiced with PWD before moving to the next class

Diary

Before beginning a class, the learner fills in a short "diary" - overall feeling, understanding dementia, etc. The data gets analysed and reported along with the Action results.

Key drivers

Guidance / Growth / Surprise

<i>Learner type</i>	Deep / Surface / Strategic
<i>Engagement methods</i>	<p>Hooking cycle <i>Assessment and taking digital notes as a way to Invest; Classes, Action, and Diary to make users hooked</i></p> <p>Gamification <i>The achievements are awarded upon successful Action completion</i></p> <p>Streaks <i>Classes and Diary are set up to a specific frequency: when followed successfully, points are awarded</i></p>

TABLE 11. Path 1: Individualized learning (Kozina 2017)

Path 2 is meant for those who want to dig deep into the subject (Table 12). This path is meant to close all the gaps that the learner may have concerning a specific topic. It is suitable for both FCG and PCG, due to their individual needs in learning. The classes are short during this path, so the learning sessions can be completed quickly, i.e. during the lunch break.

PATH 2: PRE-MADE SERIES

<i>Learning objectives</i> <i>Anderson et al. (2001)</i>	Remember / Understand / Evaluate
<i>Structure</i>	<p>Series <i>A set of modules made to master a specific topic or skill; some available for free, others available to subscribers</i></p> <p>Learning blocks <i>5 classes, up to 10 minutes long in one series module</i></p> <p>Classes <i>Animations that sums up the topic (with transcription); Study material (text and/or audio); Case Studies attached, if applicable</i></p> <p>Checkpoint <i>After the class, a learner goes through a round of assessment (e.g. test on understanding the topic)</i></p>
<i>Key drivers</i>	Exploration / In-depth learning / Curiosity

<i>Learner type</i>	Deep / Strategic
<i>Engagement methods</i>	<p>Hooking cycle <i>Taking digital notes as a way to Invest; locked content becomes available periodically, i.e. during holidays (Variable Reward)</i></p> <p>Gamification <i>Achievements are given upon the Class and Checkpoint completion; for doing 5 series, the user is rewarded with a free series module</i></p> <p>Streaks <i>Classes are set up to a specific frequency: when followed successfully, points are awarded</i></p>

TABLE 12. Path 2: Pre-made series (Kozina 2017)

Path 3 is meant for social learning. It makes people get together and learn in groups. This learning path is especially good for PCG, because they work in teams and often grow together, learning from each other. Nevertheless, both FCG and PCG can participate in online discussions within the community. To make sure the content in the online community is controlled, the users are encouraged to up- or downvote topics and answers of others. This way, people are encouraged to stay their best selves within the discussion threads.

PATH 3: SOCIAL LEARNING

<i>Learning objectives</i> <i>Anderson et al. (2001)</i>	Understand / Evaluate / Create
<i>Structure</i>	<p>Group course <i>A course with a unique curriculum is assembled by Memocate team on request of nursing homes; courses are a lot lengthier than those of other paths</i></p> <p>Classes <i>Animations that sums up the topic (with transcription); Study material (text and/or audio); Case Studies attached, if applicable</i></p> <p>Action <i>Group is delivering course tasks that are developed together in a group</i></p> <p>Feedback <i>The learning group receives feedback on their work from the course instructor</i></p> <p>Online community (applicable to other learning paths) <i>The users can create, view, and respond to the chat threads</i></p>
<i>Key drivers</i>	Socialising / Seeking & giving support / Popularity
<i>Learner type</i>	Deep / Strategic
<i>Engagement methods</i>	<p>Hooking cycle <i>Gaining popularity in the community and getting notified on the new user reactions to the learner's posts</i></p> <p>Gamification <i>People's answers in the online community are up- or down-voted - when upvoted many times, badges are awarded to the learner</i></p>

TABLE 13. Path 3: Social learning (Kozina 2017)

In addition to path 3, after observing the caregivers' behaviour on Facebook communities during the Research phase of the project, it was clear from first glance that the target group's connection to those specific communities is strong. Consequently, Memocate shouldn't aim to become the secondary Facebook. Rather, Memocate should focus on what makes it unique, and present itself as a knowledgeable advisor that could bring the

answers those people seek. That's where Memocate's strength lies after all – in its top up-to-date research.

Despite the above-mentioned possible learning paths, there are a lot more paths that could be explored and implemented. Some of them taking place online, the others offline. The possibilities are endless, and changes to the learning paths will be made systematically as the service develops.

For the purposes of this thesis, as well as the needs of the MVP, all further design exploration will continue following Path 2: Pre-made series.

4.3.4 User Experience and User Interface design

To start the design process, I've developed a site map of the service to see how the pages are connected. Image 3 presents the full flow, with the yet unavailable and undeveloped pages faded out, and those that are to be discussed further highlighted in colour.

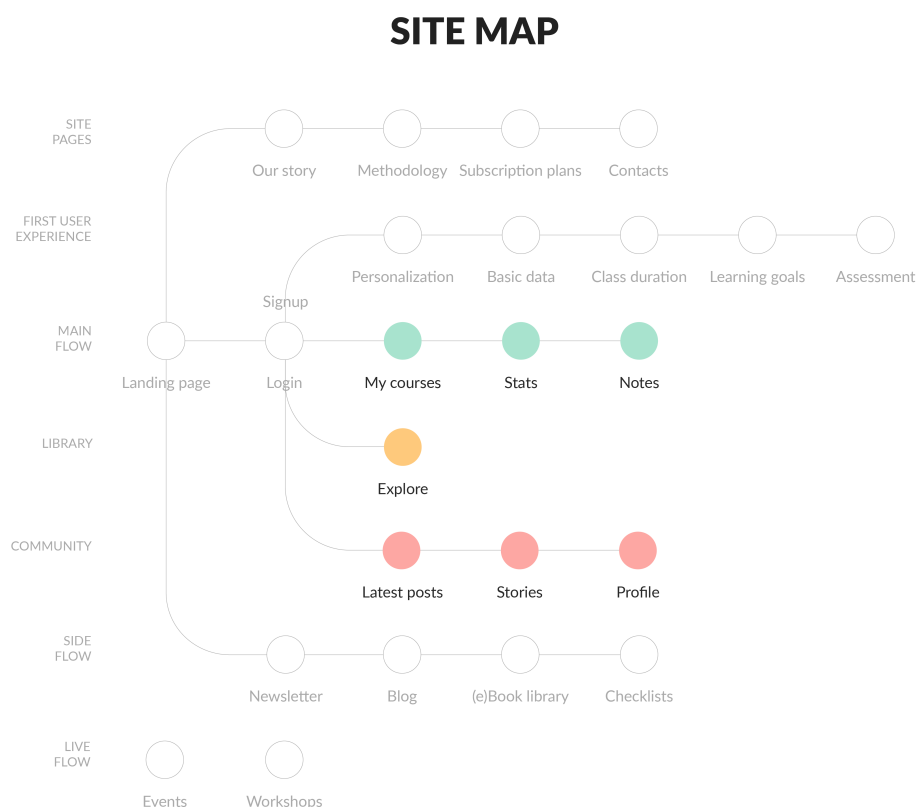


IMAGE 3. Memocate's site map (Kozina 2017)

During the Research phase I gathered that our potential users are more inclined to using computers than other devices. It has been revealed via the Google Tracking that I installed to the survey links. Therefore, for the first MVP, despite the rule of going omnichannel, we are designing the first version for desktop only.

Layout and UI elements

I have started UI design with developing the layout of the service. It ended up being set to a 9 column grid as a basis for the web pages. Having 1 column per side reserved for the padding allows the website to look less stuffed. Also, the content is “boxed” more around the centre, which relieves users from figuring out how UI elements, such as buttons, are placed on the page. Image 4 presents how the grid is used primarily, and how the content can be placed. The grid can also be modified. For instance, a modified grid with 2 columns reserved for side paddings supports readability of the users, because they don’t have to go far left and right when going to the next line.

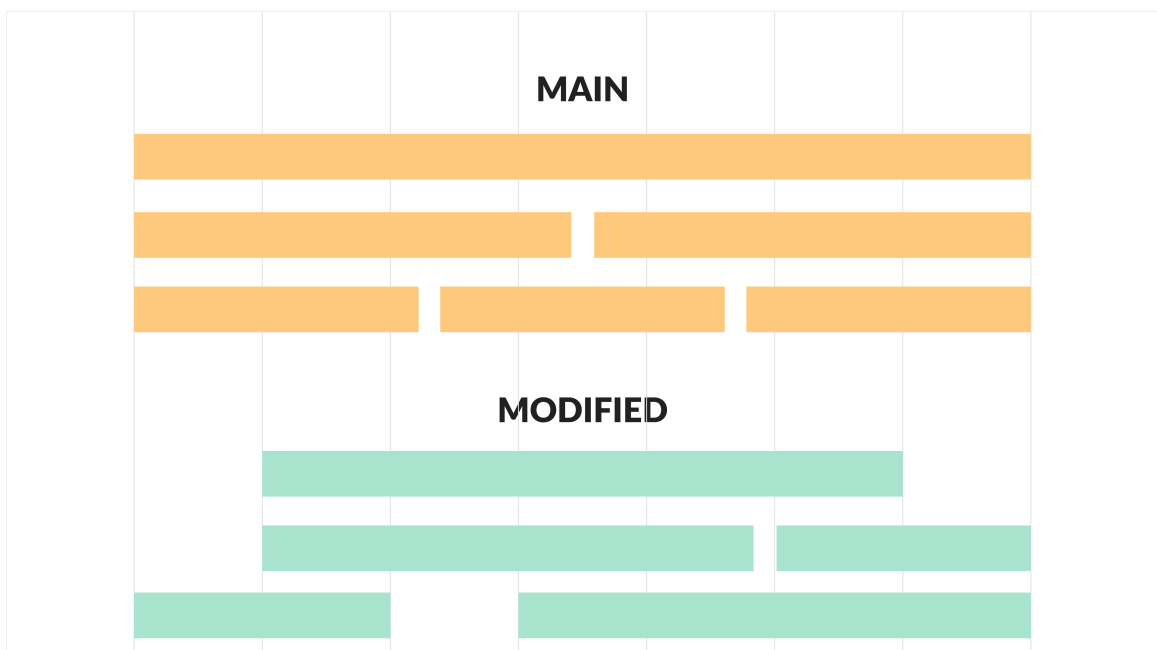


IMAGE 4. Memocate’s grid system (Kozina 2017)

To make it clear to users which elements are interactive and which aren’t, the different states of the Action Controls have been developed. This way, if the user hovers the control, he/she will know whether it is possible to interact with it or not. Image 5 shows the

controls' states developed for Memocate; “default” for its passive state, “hover” for when the mouse is over it, and the “pressed” state for when the user interacts with it. They get lighter or darker, to mimic the physical behaviour of the button.

ACTION CONTROLS

	Default state	Hover state	Pressed state
ACTION BUTTON			
SECONDARY BUTTON			
MENU BUTTON			
SUBMENU BUTTON			
ADD POST / STORY			
ADD COMMENT			

IMAGE 5. Memocate’s action controls (Kozina 2017)

In addition to the primary action controls, there are plenty more UI elements being developed, such as those for going back and forth, or exiting the page. These secondary actions are presented in Image 6. They help the user interpret the service’s possible interactions. Some of those UI elements are passive, and are meant to indicate the status of a process, function, or amount of elements. This in turn makes the UI feel less overloaded with unnecessary text or captions, and makes the interface look whole, both in layout and style.

UI ELEMENTS

Navigation arrow	Reveal options	Hide options	Menu	Close	Add	Added
Upvote	Comment	Play	Locked content	Duration	Classes #	Learning steps

IMAGE 6. Memocate’s additional UI elements (Kozina 2017)

To give the learner a clear overview of the contents of the course that he's undertaking, the learner material signifiers have been created to summarize the content type in one self-explanatory icon. They are further on used in the Classes, to give a quick overview of the steps that the learner has to undertake. Each icon stands for a different type of material, such as animation, text, or tasks (Image 7).

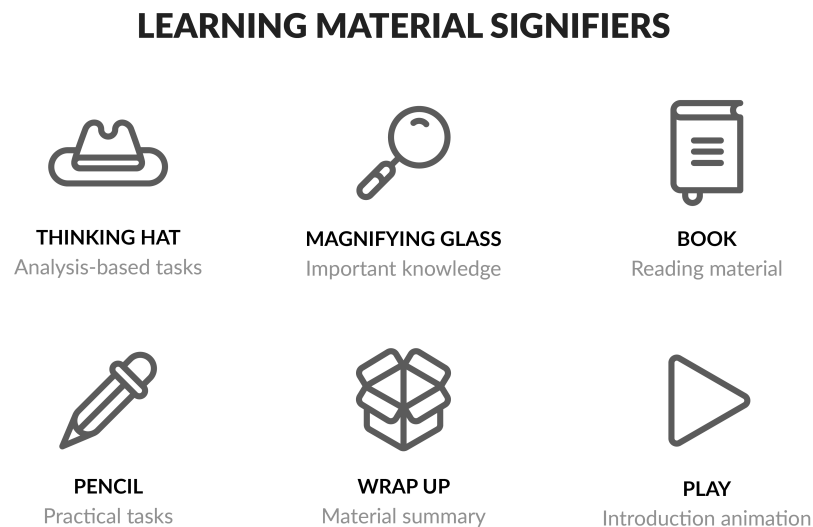


IMAGE 7. Memocate's learning material signifiers (Kozina 2017)

Interface design

The MVP vision, learning path attributes, and the before-mentioned elements have been put together into the concrete interfaces, within this section. Due to the materials and some of the icons (e.g. badges) still being in development, the designs contain placeholder content.

Class format

Firstly, I've designed the way classes would be presented (Image 8, 9). The class steps are always visible to the learners at the bottom of the screen, so they know what kind of content lies ahead, and reminds them of what they've achieved. The learner is encouraged to navigate through the learning journey, by clicking either the "Continue" button to go

further, or “Go back” to return and repeat the material. The layout adjusts according to the presented content. In addition, the learners are given the ability to make digital notes, to later return to them and refresh their knowledge, or to simply highlight what they find interesting. This is done by selecting the text, which triggers the “Make note” button to appear. Lastly, there is always a life ring button visible on the right side of the screen. If the learner is confused, wants to report a bug, or give feedback to content, they are free to do so by using the button.



IMAGE 8. Memocate’s reading content in the class (Kozina 2017)

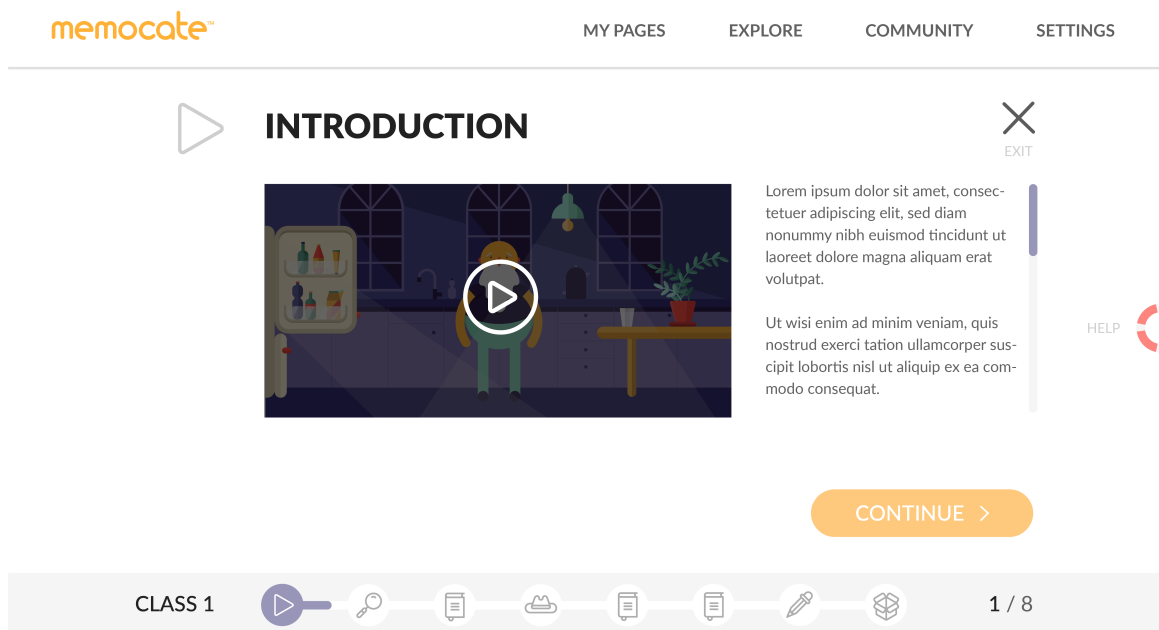


IMAGE 9. Memocate’s audio-visual content in the class (Kozina 2017)

My pages

The navigation through the Memocate service is very simple. The menu on top offers the key functions that the learner can explore.

“My pages” offers an overview of the learner’s courses and progress (Image 10). It is divided into 3 parts. “My courses” is the learner’s library of courses that he/she has taken. When opened, it reveals the course that has been taken last, and suggests the learner to continue that learning path. To give the learner motivation to continue, the page also presents “Your Streak”; the more consistently the learner grows through the courses, the more achievements get unlocked for him/her. Lastly, the learner can switch the course and continue learning something else by accessing his/her acquired “Other Series”.

“Stats” gives a quick look at the learner’s progress (Image 11). It is the place to discover how much the learner has learnt described through different variables, and also what new badges the learner has earned.

Lastly, “Notes” allows the learner to view the note cards with the knowledge that they found important - created with the “Make note” action during the class (Image 12). The

learner can get back to the original source of information, as well as leave a comment with their own thoughts. The note cards can also be deleted.

memocate™

MY PAGES EXPLORE COMMUNITY SETTINGS

MY COURSES STATS NOTES

CONTINUE FROM WHERE YOU LEFT OFF...

75 MIN 5

SERIES 1

CONTINUE >

TOPIC PROGRESSION 2 / 5

YOUR STREAK

1 WEEK 3 DAYS

DAY 1 DAY 2 DAY 3 DAY 4 DAY 5 DAY 6 DAY 7

HELP

OTHER SERIES

75 MIN 5

CLASS 1 Description

2 / 5

CONTINUE >

75 MIN 5

CLASS 1 Description

2 / 5

CONTINUE >

75 MIN 5

CLASS 1 Description

2 / 5

CONTINUE >

VIEW ALL

IMAGE 10. Memocate's "My courses" layout (Kozina 2017)

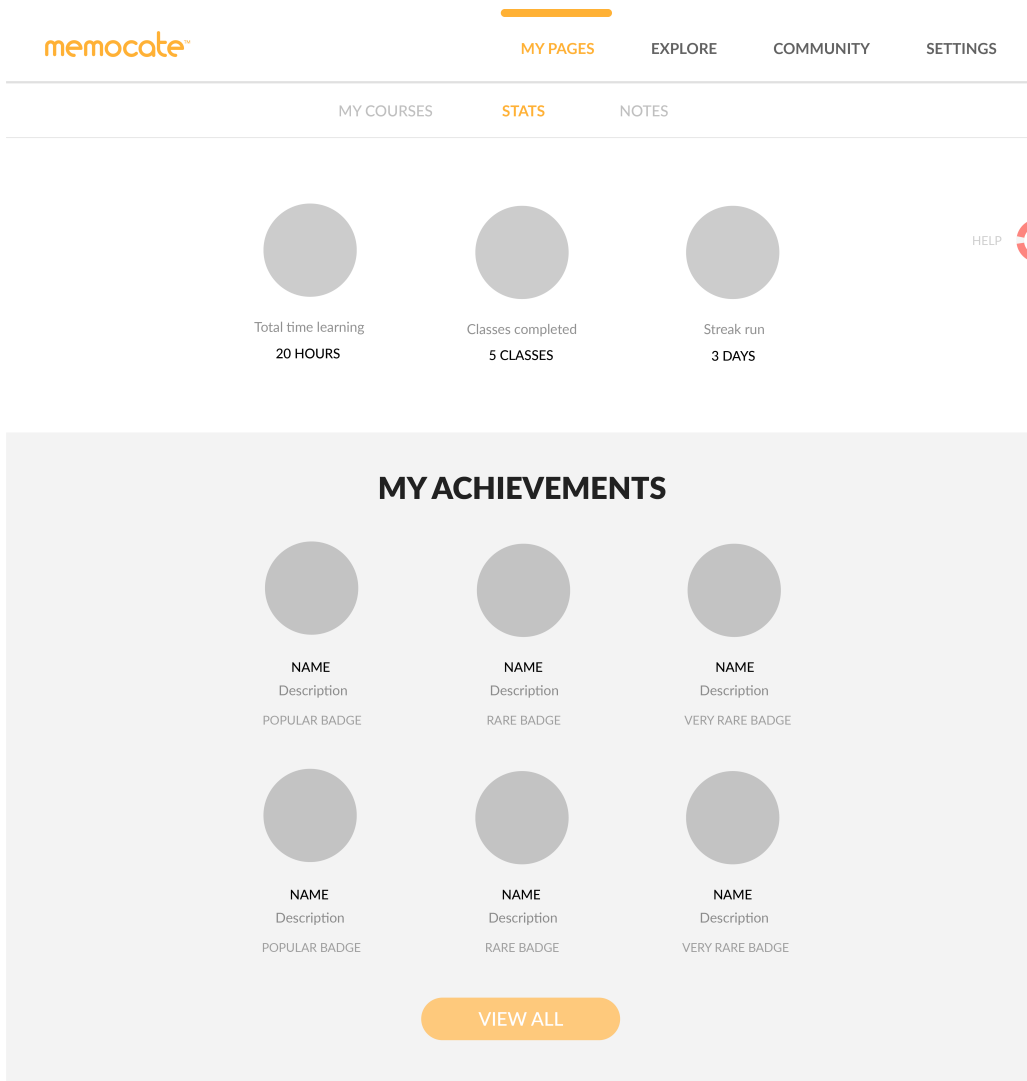


IMAGE 11. Memocate's "Stats" layout (Kozina 2017)

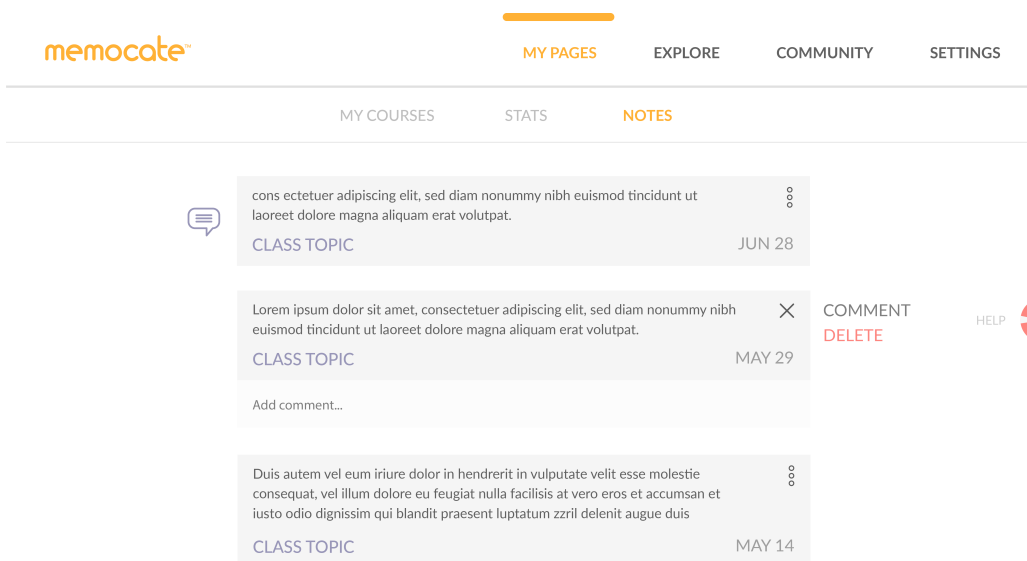


IMAGE 12. Memocate's "Notes" layout (Kozina 2017)

Explore

The learner is free to navigate through the available courses, and pick a series to follow via another menu tab, “Explore” (Image 13). This page holds the listing of all the available subjects, each of which can be selected to reveal its content. By clicking the plus button, the learners add the course to their own pages. To add a human touch and delight to the navigation, the listing has been given “eyes” that either stay closed when inactive, and awaken when used.

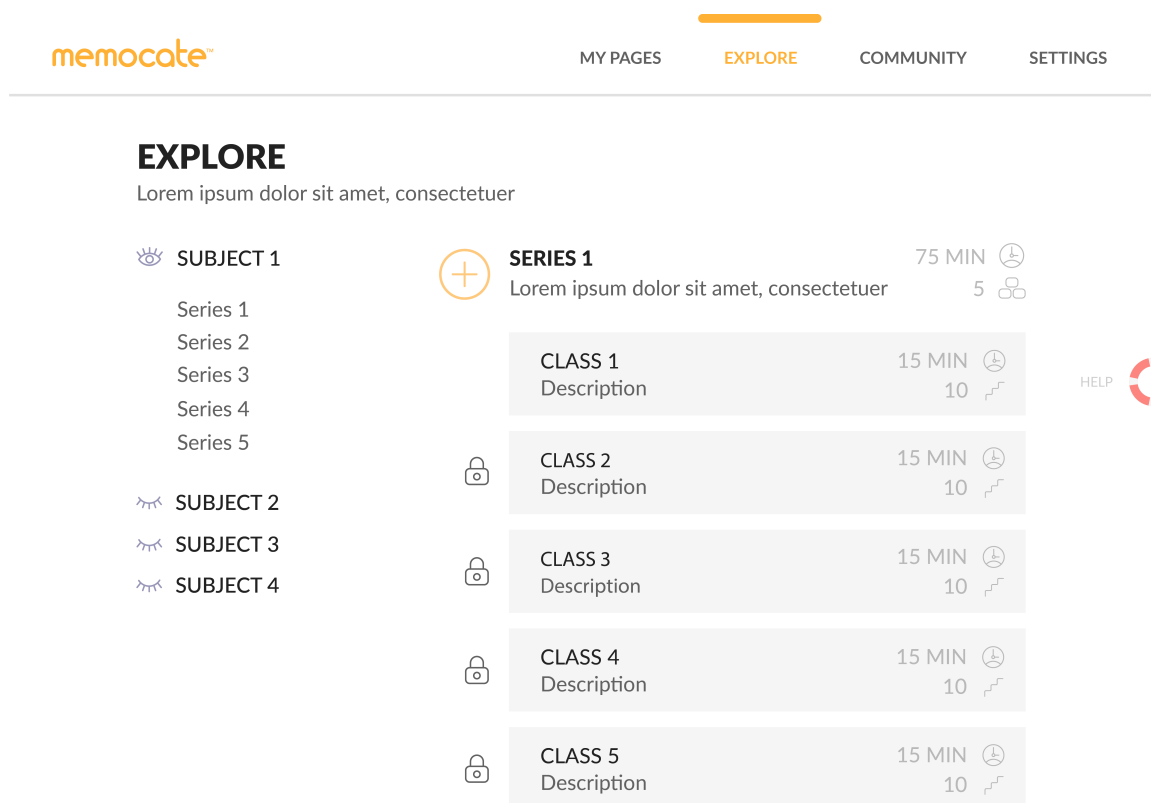


IMAGE 13. Memocate’s “Explore” layout (Kozina 2017)

Community

The third, and final, menu tab invites the user to the “Community” section of the service. Here, the user is able to interact with other users through reading the recent posts and posting new ones in the forum set up (Image 14). To apply a form of automated moderating, an upvote system is implemented. Therefore, the most unpopular topics remain out of reach, whilst the most useful topics are on the rise.

Besides from the open discussion, the users can also share their personal experiences via “Stories” (Image 15). The page consists of cards, that, when opened, provide reading material in a shape of a story. Every user is encouraged to share their stories, and are given guidelines and handholds in the hopes of maintaining quality of the user created content.

Lastly, every user can access and modify their “Profile” (Image 16). From there, the users can see their community stats, recent comments and reactions, and other attributes that aim to maintain users’ activity in the “Community”.

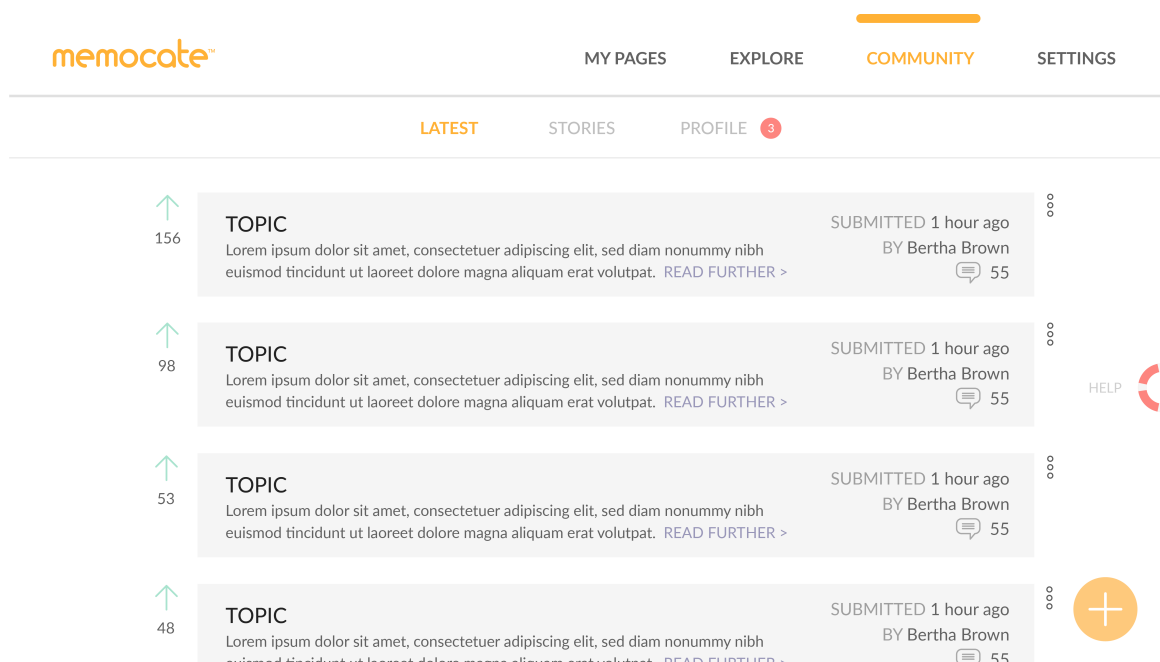


IMAGE 14. Memocate’s “Latest” forum layout (Kozina 2017)

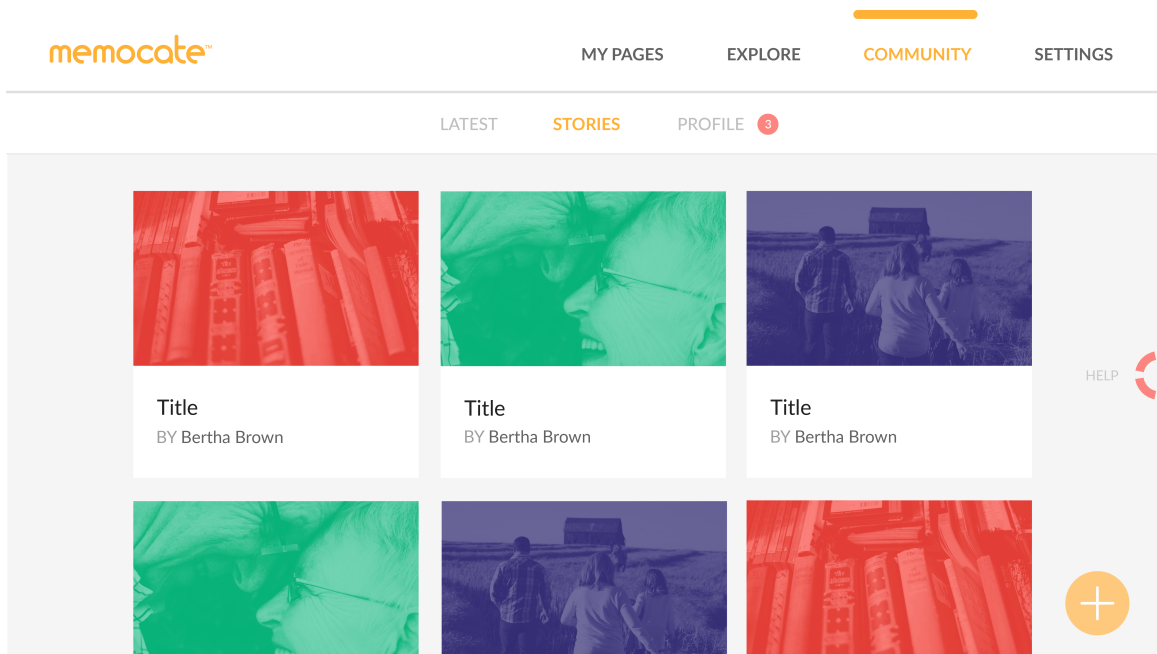


IMAGE 15. Memocate's "Stories" layout (Kozina 2017)

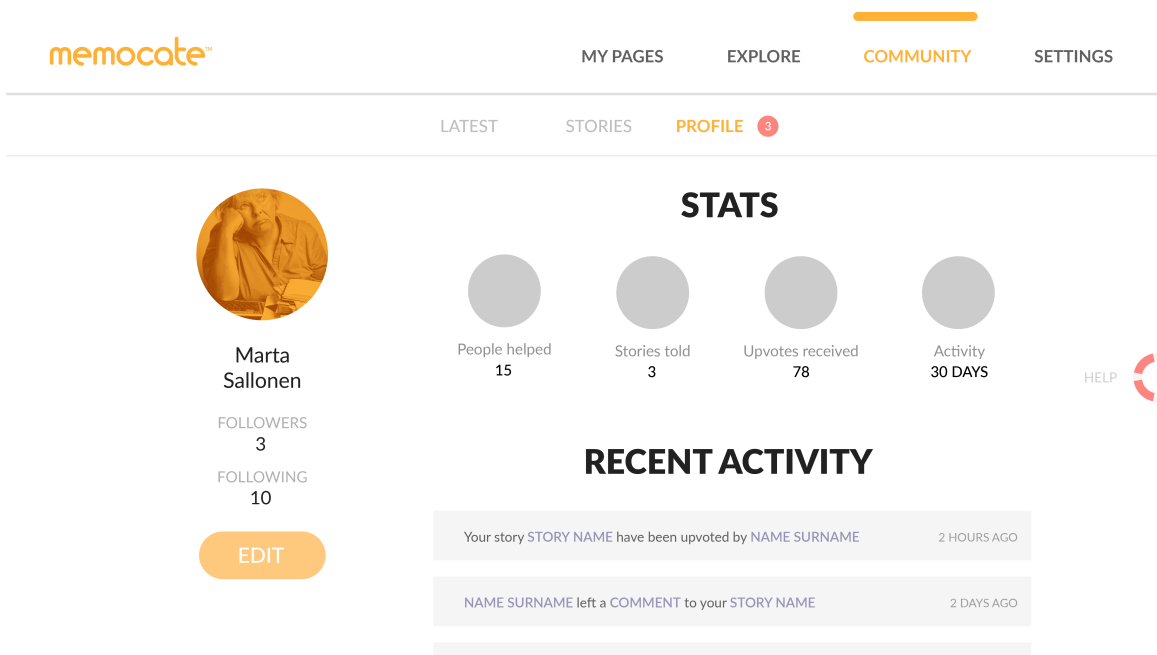


IMAGE 16. Memocate's "Profile" layout (Kozina 2017)

4.4 Conclusion

By going through all the planes of LX design, I have used research, workshop outcomes, and theoretical knowledge to create a concrete service experience and look. All elements fit to the brand identity of Memocate, and communicate its initial purpose.

5 DISCUSSION & CONCLUSION

Learning (in general) stays in constant, yet slow, development. The educational methods that were used centuries ago are used in education to this day. Nevertheless, with the advancement of technologies, and learning becoming more prominently online, more and more ways to learn are available on the market. We live in a time when e-learning is widely accessible, but with its educational methods often being questionable. However, it has been discovered that a thoughtful, functional, and delightful Learning Experience can be designed for online services, to greatly enhance learning.

The time in which we live plays a crucial role in learning. The technologies we use and channels that we are most active in are framing our new learning behaviours. Therefore, with effective learning to take place digitally, it must be designed with caution, and with thoughtful consideration to our neuroanatomical and psychological traits. The way we acquire knowledge today has changed to a time-limited, focused interval, and we absorb information in smaller chunks than before. The brain's parts, hippocampus and amygdala, play a huge role in our learning process, by sorting out what we remember and what we don't. That's why designing for the user is not enough anymore. The designer must redefine the design process itself, and shift from being user-centred to learner-centred, to be able to properly address complex learner goals and design effective ways to support memory retention via a e-learning service. This can be done by implementing elements of interleaved practice, spaced repetition, and use of multiple senses to the Learning Experience.

Designing for e-learning is not an easy endeavour. The drop-out rates on the e-learning services are high, due to the users not getting enough motivation to keep learning. For the service to keep learners engaged, it is important to use external triggers, and attempt to convert those to an intrinsic prompting of the learner. A service personality can be developed to build a strong emotional connection between the service and the learner. On top of that, the habit-forming cycle can be applied, to maintain the learner's cycle of acting with and investing in the service. Lastly, gamification elements can serve a great deal with a reward system, and keep the users motivated to acquire more badges, points, and other achievements.

Nothing must disrupt the learning process, and therefore learning must stay omnichannel, and stay synched and consistent throughout all media, channels, platforms, and devices.

Through this theoretical and practical research, I acquired knowledge that helped me to carry out a project (Memocate) and design its Learning Experience. By way of user research, I've gained a proper understanding of the target group, with its needs, demographics, and psychographics. This data helped to embody strong personas, that assisted me in keeping the learner goals in mind throughout the design process. By transitioning through the five planes of Learning Experience design – Strategy, Requirements, Structure, Interaction, and Sensory – I managed to create an enjoyable, engaging, and purposeful e-learning service to transform the lives of Memocate's users, the caregivers of patients with dementia.

REFERENCES

- Anderson, L.W., Krathwohl, D.R., Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., & Wittrock, M.C. 2001. A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives. Complete edition. New York: Longman.
- Andreatta, B. Chief Learning Officer at Lynda.com. The Neuroscience of Learning. Online course. Taken on 7.-8.14.2017. LinkedIn Learning.
- Bell, M.C., Kawadri, N., Simone P.M., Wiseheart, M. 2014. Long-term memory, sleep, and the spacing effect. *Memory*, 22:3, 276-283.
- Bisset, F., Lockton, D. 2010. Journal Article. Designing motivation or motivating design? Exploring Service Design, motivation and behavioural change. *Touchpoint: The Journal of Service Design*, 2 (1), 15-21.
- Bluestone, D. 2015. 5 Elements of Omni-Channel User Experiences. Released on 30.06.2015. Read 27.02.2017. <http://uxmag.com/articles/5-elements-of-omni-channel-user-experiences>
- Bradley, M.M., Greenwald, M. K., Petry, M. C., Lang, P.J. 1992. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol 18(2), 379-390.
- Brown, F. G. 1964. Study Habits and Attitudes, College Experience and College Success. *Personnel and Guidance Journal*, XVII, November, 289-291.
- Busche, L. 2015. *Lean Branding*. Sebastopol: O'Reilly Media, Inc.
- Carpenter, S.K., Cepeda, N.J., Rohrer, D., Kang, S.H.K., Pashler, H. 2012. Using Spacing to Enhance Diverse Forms of Learning: Review of Recent Research and Implications for Instruction. *Educational Psychology Review* 24(3), 369–378.
- Csikszentmihályi, M. 1990. *Flow: The Psychology of Optimal Experience*. New York: Harper and Row.
- Clark, D. 1999. Bloom's Taxonomy of Learning Domains. Released 05.06.1999. Updated 12.01. 2015. Read 20.02.2017. <http://www.nwlink.com/~donclark/hrd/bloom.html>
- Downes, S. 2005. E-learning 2.0. Released on October 2005. Read 27.04.2017. <http://elearnmag.acm.org/featured.cfm?aid=1104968>
- Eyal, N. 2014. *Hooked: How To Build Habit-Forming Products*. New York: Penguin Group
- Fadel, C., Trilling, B., Bialik, M. 2015. *Four-Dimensional Education: The Competencies Learners Need to Succeed*. Boston: Center for Curriculum Redesign.
- Flaherty, K. 2016. Consistency in the Omnichannel Experience. Released on 16.11.2016. Read 27.02.2017. <https://www.nngroup.com/articles/omnichannel-consistency/>

- Flavell, J. H. 1985. Cognitive development. Englewood Cliffs: Prentice Hall.
- Fredricks, J.A., Blumenfeld, P., Friedel, J., Paris, A. 2013. School engagement. Paper for Indicators of Positive Development Conference.
- Galloway, S.M. 2016. Motivation or engagement? What's the difference? BIC Magazine. Issued on May 2016. Volume unknown, p.82.
- Garrett, J.J. 2011. The Elements of User Experience, User-centered design for the web and beyond. Berkeley: New Riders.
- Hamari, J. 2013. Transforming Homo Economicus into Homo Ludens: A Field Experiment on Gamification in a Utilitarian Peer-To-Peer Trading Service. *Electronic Commerce Research and Applications*, 12(4), 2013, pp. 236- 245.
- Hamari, J., Koivisto, J., Sarsa, H. 2014. Study paper. Does Gamification Work? — A Literature Review of Empirical Studies on Gamification. IEEE Computer Society, Publication, 3025-3034.
- Interaction Design Foundation (IDF). 2002. Learning Experience Design - The Most Valuable Lessons. Released on November 2016. Read 05.02.2017. <https://www.interaction-design.org/literature/article/learning-experience-design-the-most-valuable-lessons>
- Keller, J. M. 2010. Motivational design for learning and performance: The ARCS model approach. New York: Springer.
- Kilgore, W. 2016. UX to LX: The Rise of Learner Experience Design. Released on 20.06.2016. Read 05.02.2017. <https://www.edsurge.com/news/2016-06-20-ux-to-lx-the-rise-of-learner-experience-design>
- McSporran, M., King, C. 2005. Blended Is Better: Choosing Educational Delivery Method. New Zealand: Unitec
- Neighmond, P. 2011. Think You're An Auditory Or Visual Learner? Scientists Say It's Unlikely. Published on 26.08.2011. Read on 15.4.2017. <http://www.npr.org/sections/health-shots/2011/08/29/139973743/think-youre-an-auditory-or-visual-learner-scientists-say-its-unlikely>
- Neilson, J. Music Education Designer at Yousician. 2014. Interview 23.03.2017. Interviewer Kozina, A. Transcribed.
- Nisbet, J.D., Shucksmith, J. 1986. Learning strategies. London: Routledge & Kegan Paul.
- Norman, D.A. 1982. Learning and Memory. San Francisco: W.H. Freeman & Company.
- Pandey, A. 2015. 6 Killer Examples Of Gamification In eLearning. Released on 06.10.2015. Read 03.04.2017. <https://elearningindustry.com/6-killer-examples-gamification-in-elearning>

- Pappas, C. 2016. 8 Best Practices For Designing Gamified eLearning Experiences. Released on 17.08.2016. Read 03.04.2017. <https://www.docebo.com/2016/08/17/8-best-practices-designing-gamified-elearning-experiences/>
- Piccioli, V. 2014. Motivation and learning style. Docebo blog. Released on 19.08.2014. Read on 04.05.2017. <https://www.docebo.com/2014/08/19/motivation-and-learning-style/>
- Plaut, A. 2014. Elements of Learning Experience Design. Released on 30.01.2014. Read on 30.04.2017. <http://boxesandarrows.com/elements-of-learning-experience-design/>
- Raymer, R. 2011. Publication. Gamification: Using Game Mechanics to Enhance eLearning. Learn Magazine.
- Rohrer, D., Taylor, K. 2007. The shuffling of mathematics problems improves learning. Berlin: Springer Science+Business Media, Inc.
- Schmeck, R.R. 1988. Learning Strategies and Learning Styles. New York: Plenum Press.
- Sitzmann, T., Ely, K. 2009. Web-Based Instruction: Design and Technical Issues which Influence Training Effectiveness. Presentation for Advanced Distributed Learning Co-Lab Hub. Held on 06.03.2009.
- Sørensen, A.A. Head of Learning Innovation at Memrise. 2014. Interview 09.04.2017. Interviewed by Kozina, A. Transcribed.
- Walter, A. 2011. Designing for emotion. New York: A Book Apart.
- Weigel, M., James, C., Gardner, H. 2009. Learning: Peering Backward and Looking Forward in the Digital Era. International Journal of Learning and Media, Vol. 1, No.1.
- Weigel, M. 2015. Learning Experience Design vs. User Experience: Moving From “User” to “Learner”. Released on 15.04.2015. Read 05.02.2017. <http://www.gettingsmart.com/2015/04/learning-experience-design-vs-user-experience-moving-from-user-to-learner/>
- Yassin, L. Doctor of Philosophy (PhD), Neurobiology and Neuroscience. 2004. Interview 21.03.2017. Interviewer Kozina, A. Transcribed.
- Yassin, L. Doctor of Philosophy (PhD), Neurobiology and Neuroscience. 2004. Lessons from the brain: Neuroscience meets service design. Lecture for Futurice Oy. 2017. Location: unknown. <https://vimeo.com/171102271>

APPENDICES

Appendix 1. Fragment from “Learning: Peering Backward and Looking Forward in the Digital Era” by Weigel, James, and Garner (2009)

Table 1 Learning Over Time

Periods	WHO learners	WHERE	purveyors of learning	HOW dominant pedagogies	dominant instructional media	dominant cultural media	WHAT major content/curricula	implicit content/curricula
pre-literate era	all children	family, community, “bush schools”	family, community	participation, observation	indeterminate	oral	meaning-making in context	survival, documentation, ceremonial
pre-modern era (1439 - 18th c)	mercantile and elite males	apprenticeships and formal schools	experienced and knowledgeable adults	participation, observation, instruction	images, text	images, text	basic literacy, technical or specialized domains	commerce, obedience, religious education
modern era (19th c to 1950s)	w/rise of public education, most children ages 5-18	formal (classroom)	primarily female educators, teachers as experts, students as passive recipients	uniform schooling, received wisdom, one-size-fits-all learner/learning	print	rise of mass media - print, broadcast (radio/tv/film)	humanities and language/literacy, socialization, routine	preparation for work, discipline, citizenship education
late/high modernity (1960 to 2000)	all children	formal (classroom)	teachers as experts, students as passive recipients (emergent: teachers as facilitators, students more active)	uniform schooling, received wisdom, one-size-fits-all learner/learning (emergent: early constructivism, early individualization/multiple intelligences, social learning)	print, some broadcast	mass media - print, broadcast (radio/tv/film) emergent: digital media	emphasis on science vs. humanities/literacy	consumerism
personal computing—digital age (1980–present)	all children	formal (classroom) (emergent - informal; classrooms persist but learning increasingly happening anywhere)	teachers as experts, students as passive recipients (emergent: teachers as facilitators, students as co-architects, self-directed learning, peer learning)	uniform schooling, received wisdom, one-size-fits-all learner/learning (emergent: contextualized learning, social learning/distributed cognition)	print, broadcast (emergent: digital media)	mass media digital (internet/web 2.0) emergent: portable digital media	emphasis on science (emergent: interdisciplinarity)	diversity, consumerism
future—insufficiently supported	all (lifelong)	formal for all, informal for privileged	self learning, peer learning, teachers less relevant, students as unsupported, limited learning due to distractions	split between direct instruction and autonomous work, direct instruction, traditional pedagogies remain, autonomous work, contextualized learning, social learning/distributed cognition	print, broadcast digital (internet/web 2.0), portable digital media, augmented reality	digital (internet/web 2.0), portable digital media	3Rs, disciplines, interdisciplinarity, metacognition, new media literacies, globalization, ethics	global participation as a thoughtful producer, consumer, and citizen for some
future—well-supported	all (lifelong)	formal and informal for all	self-directed learning w/ supports peer learning w/ supports, teachers as facilitators, students as co-architects	balance of autonomous and scaffolded learning, supported constructivism, contextualized learning, social learning/distributed cognition	print, broadcast digital (internet/web 2.0), portable digital media, augmented reality	digital (internet/web 2.0), portable digital media	3Rs, disciplines, interdisciplinarity, metacognition, new media literacies, globalization, ethics	global participation as a thoughtful producer, consumer, and citizen

Appendix 2. Interview with James Neilson (Yousician) from March 23, 2017

If you could tell me more about yourself and your background.

Okay, so, my background is a combination of a few things. I've been playing and teaching music forever, and my other main background is in psychology and teaching. My formal education is in cognitive psychology – which is mostly interesting in learning, memory, perception, and things like that. Education is a really big part of that. So I always loved teaching, and would always teach music in schools and watch stuff as well as teaching in university in psychology. But I really wanted to spend more time on music, and I was really lucky to find the Yousician company. So it's great to be able to combine all those different areas together.

Sounds great. When you study psychology, you understand people so much better. Did you feel the same way?

It helps a lot! And there's lots of interesting areas in psychology. I find the cognitive stuff particularly interesting, and I think you learn a lot about related areas like education for example, that you might not get in other areas of study. Looking back when I went into full time music teaching, it might have seemed like a crazy thing to move away from psychology, but in the end, I feel, it worked out really well. *There's obviously a lot of psychology we use at Yousician – how to teach and how people learn.*

I feel like there's a lot from informal education; when people get together and someone shows someone how to play a couple accordions and they have a jam and they have some fun. There's a lot that formal education can learn from that process, and I think education itself can be a similar type of thing. There's a lot that I learned when teaching, just by simply getting up and teaching, and having a go, and seeing what works.

Okay. So now that you're teaching people, do you still do a mix of those two, or do you prefer informal?

Now it's definitely a mix. But the principles are the same thing anyway. *One of the things that is always really important when teaching is trying to figure out how to simplify something to someone; how to break it down.* So now I might be thinking more about *cognitive load*, or those sort of formal terms. But it's being the same thing forever. It's just trying to *think of effective simple ways of conveying some sort of information in ways that the students can absorb it.*

What do you think are the main challenges today that education designers are facing. Because the whole thing shifted from this sort of formal learning to informal, on different platforms and so forth. So how do you think they deal with it as instructional designers?

I think, for me, *the biggest challenge is face-to-face feedback.* If I'm teaching someone face-to-face, it's interesting – when someone doesn't get something quickly, you can re-explain or go back, you can give them time when they need it, you can draw, etc. *And not doing that face-to-face is not getting that type of immediate feedback.* That's probably the biggest challenge.

Yeah, I have to agree with that. I think that's one of the things that services still learn how to do it. To track the user progress, or anything like that – how people are managing. Because how I see services like this is that you are building a personality incorporated in the service so that the user feels more attached to what they're learning and attached to the *guide* – even though there might not be a specific guide. It's often still a sort of one-way-communication between the user and service. So it could be quite interesting to see if somebody ever develops this sort of response mechanics.

Yeah, and a lot of is... momentary things that happen in the studio, that you can see a facial expression or reaction to something. And often experienced teachers are more aware of it than the students are of it. *It's really hard for students to recognize when they're experiencing too much frustration or when they're most lost than they should be.* Because obviously they are going to go through a process with struggling a little bit. Yeah, so I guess it remains to be seen, but I guess with increasing A.I. and all that...

So, how did you end up in Yousician?

Well they made an earlier app, like a precursor to Yousician. And I was teaching guitar and came across that app I thought “that’s fantastic!” I started using it with my students. I thought “alright, this is the future of music education,” so I wrote some songs and a cover letter and sent that in, and then got the job.

I know of plenty of people that use the app. It’s crazy to hear that it’s not that old, so it means that people really do have a need for this type of service.

I think so, yeah. As a teacher, I’d do some classroom stuff, but most of it was *individuals or small groups*. And that means I’d see them once a week, and then in between that there’s that whole stretch of time where they’re just on their own. Even if you got the teacher week-to-week, it’s very rare that someone can just once a week and thrive by themselves at home. Not many people just instinctively get it, or are willing to put in the amount of hours that it takes to get to the point where you do get it. So I feel like there’s a massive need for that sort of companionship – having a coach with you all the time.

So how did you made sure that people feel like they have a companion through Yousician?

It’s really tough! *Feedback is essential*. So immediate real-time feedback on how you’re going – there’s that kind of feedback that’s important, and it’s the same type of thing you get with a teacher. In fact, this is one of the advantages of a computer, there is more feedback than you get from a teacher. Because if you’re with a teacher and the teacher points out every single wrong note you play, it’s just incredible annoying and it takes up way too much time. So you just don’t do that. So *the accuracy and timing kind of feedback you get is really important and is difficult for a human teacher to do*. And there’s this sort of *longer-term feedback*: so you finished the song; you get your stars and your points; you see your history of how many points you’ve gotten before, so it’s referring to further back in time; you see your progress through syllabus, so you can see all the missions you’ve completed and the stars you’ve done and stuff you got to go back and work on some more; etc. So you get this immediate feedback plus historical feedback, which is also very difficult for teachers to maintain. If you want to be writing down their performance standard of everything a student plays through every lesson... it doesn’t really work that way. And they’re not going to write it down for themselves at home, so I think that the feedback is a really really big component of it. It makes it feel like you’ve got someone there. And part of it is just record keeping, and part of it is super high-tech polionalysis stuff... that I don’t understand. But other people do.

The thing that’s harder is personality, that part of what you have with a teacher is a personal relationship. Whether it’s classroom or individual, most people still feel like they have a personal relationship with some of their favourite high-school teachers, right? Let alone with a personal teacher or a private teacher. *There’s a lot of that personality and relationship that comes through. That’s much more difficult; it’s super natural for a person, but less natural for a device*. But, people feel pretty connected to their phones and their iPads, and we try to make it feel fun! We put silly lyrics in lots of the songs. *Try to make it feel like the app has personality and a voice*. So hopefully that comes through.

For me it’s also interesting, from the social perspective, to ask why is that. I guess we are just so eager to bond with something and have a conversation with something that if it’s a phone it can also be it.

I feel like there’s something about touch as well. It just seems to connect with people. *We are using computers plenty, but there’s something extra about touching a phone*.

But I have a feeling that the thing with touching, it’s more about that the phone replies with something, that the button can bounce, or it will vibrate, or what else. It’s almost feeling like you’re doing something to it. I think that’s maybe the interaction that matters a lot.

I was listening to an interesting podcast the other day, and they talked about A.I. versus robotics, and there seems to be this extra emotional response that people have to robots that exist in the real world. You know, you can pet the robot dog, you can see it moving and hear it barking.

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And they seem to have more of an emotional connection with that than they would with the same thing rendered on a screen that you can't physically touch. So there might be something in there to.

But I feel especially on mobile devices it is something super engaging. One of the first things I learned with Yousician was... So normally in music lessons you typically have the music up on the music stand and the student is looking at it – and instead I'd put the iPad on the music stand. The look of concentration, that they're just a thousand percent focused on this iPad, was just astounding. That was really one of the things that I noticed; it draws attention in ways that other things don't. So I feel like that goes some of the ways of recreating that human connection.

From your experience of how learning works and how you can teach people – what were some of the main key points that you kept in mind while designing Yousician?

Well, of course there's a big team of people that did it. But some of the things we all thought about included an, in my opinion, unnecessarily steep learning curve for a lot of people starting music, and it's presented as dense complex stuff in formal education. *And then you have this massive contrast with a couple of friends getting together, and one chose another how to play. Nothing is dense about that, nothing is impenetrable. It's just "put your fingers here" *plunk* *plunk* *plunk* And so one of the things we really wanted to do was capture as much of that simplicity as we could. To lower the barrier of entry. To make it feel more natural and initiative.* If you sit down with anyone it turns out they're musical. In my experience everyone can do this. But... you put people in front of a sheet of music and tell them "it only takes six months for you to learn this, before you can play your first some properly"... So, yeah, that was one of the really big things; *simplify, make it easy, make it approachable, make it fun, it doesn't need to be such a big chore.*

The other side of that is that if you sit down with a friend and plunk away and learn to play smoke on the water/smoke underwater it's really hard to progress; *everyone just plateaus and gives up. It is extremely common that without some real structure and guidance and direction... and it's difficult!* There's a huge amount of stuff to learn – an unlimited amount of stuff to learn. *So we really wanted to try to make it immediately engaging, so you can get straight into it, but also in long term engaging. So you can complete learning new things, you can real progress, learn real skills, build a sense of mastery, of ownership. So it should be a real education tool, but simplifying things as much as possible, scaffolding everything effectively, really thinking about ways of making music generally much more approachable and friendly.*

It's basically gamified education. I would argue that all education is gamified anyway, even if it doesn't call itself that. You're in class for a term, you do a bunch of assignments, and you get an A in the end. We just give three stars and a high score. And there are all these different steps along the way, and ranking in the classes, leaderboard. It's all that those game mechanics stuff. You finish weeks and terms and years, and then you graduate to the next level. But *the idea of with this more modern gamified stuff is to try and do it as effectively as possible.* So I feel like gamified education is a reasonably good summary of the general approach. *But we definitely don't think of it as a game - it's a learning platform.*

So I managed to find a person, she's a neuroscientist, and she was actually studying how memory works from the inside of the brain. And we just had an interview, she told me that as long as you put a couple of strategies together - for instance in your case it could be practicing plus listening plus seeing notes plus there's a colour coding - all these things make the neurons fight together in a mix. And that creates the effect of learning as she said. It all sounds so easy but at the same time many services just create the reading material for people.

I completely agree with that, and the other thing I'd add in there is that *so many things can be learned implicitly; unconsciously.* You can learn so much about how pitch works on the piano by just playing some songs. If you're hearing music all the time, you start to associate the sounds of what you're doing and then before you know it you start to play stuff. The other thing, too,

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that I was thinking about was that *a lot of education mixes up what we in psychology would normally call procedural and declarative knowledge. So knowledge about something versus the actual knowledge of how to do it. So if you think about a description of how to strike a piano key: you can read about that in the book, and an educator might say "I told him to do it, and that's my job." But that's just declarative knowledge; they know about the idea of striking a key. But that's different from procedural knowledge, from the ability to actually strike a piano key.*

I know Yousician has quite a good onboarding experience, it's also trying to personalize the app for the user. Could you tell me more about the process there?

Onboarding's tough. If a private student comes to you there's a fairly familiar pattern of things that you do as a teacher. And *if they're a complete beginner then in general they're quite unlikely to know exactly what they want to do; they want to be introduced to the area. Whereas with someone who's much more experienced they'll say exactly what they want. So we tried to make things feel a little bit like a real world experience if possible.* But it's an extremely difficult process and is always something that's important to keep looking at. Keep improving if possible.

I just have this thought that with a new service many people just avoid given a proper onboarding and then you just dive into the app... and that's also strategy if you ask people "OK this is the app, try it out and see you see what happens." But I think what Yousician did really well is not just telling people "OK this is how to will work." I think that simplicity indeed drove the whole process, because everything comes in very small chunks of information/steps. Even though there are *many* steps, but they are rather small so it's quite easy to manage with those in the beginning.

Some people buy new music book, open the cover, and start at page one, and follow what the book says. But some people **flick* *flick* *flick** to look for something at the end. They just want to explore it and see what's there. And *I feel like it's difficult to manage the different ways that the different people instinctively want to explore or be introduced to something.*

I think that's actually the thing about onboarding; that you actually set the right tone and already start guiding people towards what's up here and what you can do. I was thinking that you need to tell people what you can do what you cannot do and then they will feel more comfortable, but it's indeed more about personality.

And especially with a learning app. *A lot of people approach learning something new with trepidation; "Argh, I don't think I'm going to be able to do this."* A lot of people talk themselves down. Other people *don't* - I was always like this as a learner, and for someone like me you can just do anything. But I think that seems to be the minority of people - that most people will talk themselves down a little. *So tone, makes a massive difference. Really just thinking that you can do it, is a massive part of the battle.*

I was wondering, so users come with different goals when they download Yousician. How did you try to understand how many types of users you're getting and how do you deal with that? Because obviously some of them will be more happy with what they're getting, depending on how much they can do compared to what they actually wanted to do.

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Why didn't you build your own community tool?

Well we did. But *it just wasn't as good as social media, like Facebook.* **Laughs** We got a user forum and everything, but what the other thing is that when people share things on Instagram and Twitter and whatever... You know we share this certificate if you finish a level, so they'll share the certificate or share parts of them performing certain things – playing a song on Yousician. So I feel *those* types of things can be really good as well. Because *you see what a person themselves values about their own playing and their own learning – what they feel most proud*

of. And what they're frustrated with – if they're frustrated with something, they'll put it up, which they wouldn't have if I was in the room observing them while they're playing.

So I have the feeling like iterating everything on the way – no stopping where you are, but going on and on, trying to make it perfect for the user – *that's* the way to go. These days especially. In Yousician I noticed you use different learning strategies. Could you explain which types you used and why specifically them?

So I think it's an interesting area. So *when cognitive psychologists look at people – because there's often the claim that people will tend to be visual learner or a kinesthetic learner – but it's not person-based, it's task-based.* They don't find that someone is a visual learner so they will learn everything better visually. *What they tend to find is that some tasks are better presented visually. And everyone will do better if that particular task is presented more visual.* And that'll change for a different types of tasks. So *the approach that we had with these different ways of interacting, is that in each case we're trying to think “Alright, what's a really ideal way of dealing with this type of information,” and it might be that there are multiple good ways.* So when it comes to learning a chord, what we tend to do is think about what's most functional; what the core thing is that will result in someone being able to play music in the real world. In that case practicing and putting your fingers in the right spot is *super* essential; you've got to be able to do that, you've got to be able to change between different chords, and you got to be able to memorize them too. So first is jogging the memory, show a video of how they learned it that goes slow enough that they can do it at the same time. Give them a couple of tasks where they look at a chord diagram that shows them where to put their fingers and give them immediate feedback while they play it. At that point that's going to be better than tapping dots on the screen to show where your fingers would go. That might be a useful thing to do later on, maybe it's a good thing for memorization. But for the immediate thing of trying to get the skill, let's get them actually playing.

So the learning style depends entirely on what the purpose of the exercise is and then we just use what we think is hopefully the best thing there. And if it's not, we'll find out and change it.

There's a good book called Thinking Fast Thinking Slow, and it's basically just describing that the system-one-thinking is the fast and intuitive snap judgement, and system-two-thinking is the more smaller and deliberate reasoning. And it's basically a discussion about how we used these two different systems and how they work and where our biases tend to be. I think that once you get to a point where you can just do stuff and you don't stop and think about how you did it, *that's* a big part of music. And I think it's a big *most* things that seem impenetrably cognitive and thoughtful. If I talk about the thought processes that go on when on improvising a solo, *none* of those thoughts are on my mind at that time. A lot of that just comes from trying to learn by practicing the skill rather than by learning the things theoretically. So I'm not saying you *shouldn't* learn about it theoretically, but just mean that the bulk of the time and effort should be to just do it.

The model should make it functional/applied, let the brain start to do the thing that it's extremely good at, which is noticing little patterns and seeing connections, and forming everything together, just like the neurologist was saying. And then structure more of that theoretical knowledge on top of that; scaffolding, and start to build on acquired knowledge all the time.

So we talked about gamification elements and I agree with your point that nowadays services should utilize it all the time to make the whole experience more fun and more approachable as well. But I'm curious, in Yousician which gamification elements did you use and why?

Yeah it's a good question and we're in a slightly tricky position with Yousician specific, and *it also seems to be a bit of a transition time for education in generally. If you make something too gamified, it feels like a game, not an education product.* So that's one sort of barrier of trickiness. I think *the other thing is that gamified education is still sort of a relatively new idea.* So when gamification starts to be seen as completely legitimate and a central part of education, *it'll maybe change a little bit what we can think of. So if something feels too gamified, it feels like something that can't be taken seriously.*

Have you come across *interleaved practice* before? It's a useful one to think about. *It's especially useful with complex skills. It basically means mixing up different things.* So if you've got to learn topic A, B, and C, you don't just spend a week on A, a week on B, and a week on C. The most effective way to do it is to mix them up; so you're doing a bit of A, a bit of B, and a bit of C, and *you're revising all things over the same period of time.* So as you can imagine, it's really useful with music in particular. So what you want to try and do is actually mix it up – so later songs will reuse earlier learned chords, and we'll keep on coming back to it. The other thing is that as you progress through different missions, your progress is marked, so you will see “ah, I'm missing twelve stars in this mission, I'm going to go back and collect those stars.” Which gets you to do interleaved practice and spaced repetition. *So spaced repetition is basically the same thing; you have a break, you come back to it, jot some memory, learn some more, etc. So I would argue that's gamification.*

I noticed that in Yousician, you can actually try to unlock levels that are further on even if you haven't finished the first one. Is that something where you used interlaced learning?

Part of the idea with that is that people are going to come with experience potentially. We have a particular sequence of things syllabus, so if you've been learning by yourself or with friends or teacher, you might have wanted to see a completely different sequence. So part of it is to allow people to jump ahead and skip over things and unlock everything before that, to then go back if you want to. So it's designed specifically for mixing it up a little bit with the order of things, but also we try to encourage people to jump around and back and forth a little bit – and the skill tests help that to. Part of it also, as I was saying, that some people want to just flip to the end of the book; it's meant to address some of that needs to.

Was there any feedback towards that?

Basically, *people tend to quite like the ability to unlock things.* We've tried a few different formats for those skill tests, but generally we get positive feedback about the idea of being able to just stick around a little bit. The other thing is the Songs tab. That has everything as well, and everything is completely unlocked and accessible all the time. So that's meant to serve some of the same kind of function. *Some people really want a clear sort of guidance – “this is the next that I'm going to do” – and some people are just going to want to explore.*

So when I was thinking about like learning and e-learning. What are, in your opinion, the main advantages and disadvantages of e-learning?

It's early days. So I think it's hard to know what the exact advantages and disadvantages are going to be. *One of the big things is feedback and record keeping.* So I think there's a lot of interesting stuff going on with classrooms of the moment, using more of these things in the classroom. Where the computer has a complete record of all the math problems the student's gotten right and wrong and how long they took to do it, how long they hover over the correct answer, and different things. *So the measurement side is an enormous advantage.* A big part of teaching is not just passing knowledge or helping to build skills, but it's also the *personal engagement; opening up someone's mind to become a better learner, or having someone that you look up to.* So I think that *those* kinds of things are some of the big challenges there at the moment. But I feel like they don't need to be in opposition to each other.

So if you got someone who only uses e-learning and never interacts with other people in any way then I think that would potentially have some drawbacks in terms of the human interactions side of learning. *But it seems to be the case that a lot of things are quite social – and even if they're not that social to start, people will often find a way to make it a bit more social.*

The huge strength of the e-learning – distributing everything instantly to everyone and measuring everything you've done – that can work really well at home by yourself, if that is paired with this social and interactive stuff.

Appendix 3. Interview with Anne Aalund Sørensen (Memrise) from April 14, 2017

Please tell me about yourself.

What I'm specifically looking at and what the company is focused on is language learning, which obviously has a lot of different components. We've established a research team three months ago, that are essentially going to look at *how we can optimize the learning experience*. From our perspective it is obviously about how quickly can we build the skills needed in order to speak and communicate in a different language; how quick can you build the vocabulary, how many tests does it take, what type of tests are the more effective ones, how much of a challenge does it have to be before it sticks better. Traditionally what Memrise is based on is a concept known as *spaced repetition, which essentially says "if you want to memorise words, you're better off not repeating things 50 times in a row, but you want to repeat it in slightly different ways."* You want to be reminded of those words after a certain interval of time, because the reminder that you get when you are otherwise just about to forget is a stickier reminder than the one you get when you were not in danger of forgetting it.

That's the basic attitude foundation of Memrise has traditionally been; spaced repetition. And that if you want tinier reminders, time your revision in a way that targets the point in time where you would otherwise have been about to forget the fact.

So for instance the learnings probably come with different goals. How do you meet their goals? Because I can imagine some people come to just learn the basics, the others would for instance love to improve the language. How do you know that you meet the wishes of all sort of people who come to service?

So we have thousands and thousands and thousands of courses. So Memrise is not only about the courses that we make - our official Memrise course - but there are courses made by thousands of people. I don't remember how many unofficial Memrise courses we have, but I know that when I started about two and a half years ago, we had over three hundred thousand courses that were created by users. That's how it all started it's all crowdsourcing courses. So the courses that we make are currently very 'word-listy'. But that's something that we're looking to improve on and change, so that it becomes more of a holistic language learning experience. But the courses that we've made take you through the first two thousand most common words of the language. Which as it happens covers about ninety percent of what you will ever hear. So that's quite nifty. And *it's divided into seven sections, so if you were not a complete beginner, then maybe you would start in course three, rather than in course one*. But apart from that we have all the unofficial courses that one is also free to browse. *But that's not really something that we're particularly in control of, other than that we provide the tools for the people to be able to put these courses together*.

How do you know that the student has learned anything? I think with your service it works almost magical, because you *repeat* so many times the same word that it actually sticks to your mind eventually. But how can you do the same thing but for more complex topics - do you think repetition will be as effective or should there be something else?

I don't remember many facts from my reals of studying history, but I do remember *the method and the process*. And I remembered the *different questions that you would have to ask in order to understand and to interpret things in the right way or in a real way. So when it comes to right-or-wrong kind of topics, then I can see how spaced repetition learning works. When it comes to less fact-based and more ideas-based topics, then I think it takes a deeper discussion in order for you to learn in a way that makes it stick to your mind*. However, Memrise also worked, for a long time, with a concept call Mems. I think *you need to learn with some kind of an emotional connection, in one way or another, in order for it to stick*. What we found is that they work really well when they were done really well - they worked *terribly* when they were done terribly. So I think *that's* the thing right: *if you want to create these indestructible hooks in your memory, there has to be some kind of emotion attached to the initial encoding of the thing that you're learning*.

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If people take the same language course as Memrise, but given in a very different way - they just give videos, texts, and a quiz - interaction and some steps that are more defined for the topic work better. So how can you bring these topics in the best way?

I think the difference in what we're doing, and what other platforms are doing, is that we will *continue* to test you. So I think *a lot of other learning platforms work with the concept of short term memory, and we work with both the concepts of short term and the long term memory.* Because we will test you on the same word as well three months down the line, or six months. *Not* frequently, obviously. *But to see if it's still there.* But I don't I know what the ambition is from the other platforms or what their intentions are, or the topics that they teach. But I think *that should be, in evaluating platforms like that, part of the thinking process.*

How do you keep in mind the user motivations, and how do you support that through the service to move the users forward and learn more?

It's not something that I can answer. But I think that *when it comes to learning, a product can do a lot to entice learners to come back and to make the experience itself worth coming back to.* To make it encouraging and compelling enough that when it comes down to it... *With learning, it's a little bit like exercise, that you are to some extent trying to impact on someone's lifestyle.* So there is a question of user motivation itself, that is a little bit difficult to answer from inside this office. So the thing that you can do is to, *from the product's end of things, make it as compelling and as interesting and encouraging as you possibly can and as immersive in many ways as well.*

What in your opinion are the main advantages and disadvantage of e-learning, as opposed to traditional learning?

I think that *e-learning is unthreatening.* Especially when it comes to language learning. It's something that you can do on your own and you're not really judged by anything. Whereas if you're in a classroom with a bunch of other people, it's a very different environment. On the other hand there are things that you - *from an e-learning platform - will have to solve in very creative ways, in order to create the same kind of communication and the same kind of learning value that you get in a classroom* where you had a teacher or where you could just put your arm up and say "I don't understand." There's a lot of things that you, in communicating what you want to teach them, will have to anticipate. What happens inside to learner's head is completely different from what you do in a classroom. *Because in a classroom, as a teacher, you look around your classroom and you see who looks puzzled - that's really difficult to do through an app.*

You're designing an interactive service, but there are also researches done that say that if you're having a tactile experience at the same time as you're learning that the learning materials will stick better. How did you guys utilize that, or did you come to shift your focus to some other things that can help it stick?

I think the Memrise was one dive into finding out how we can create some kind of attachment to this fact, or this world, or this piece of knowledge. Which we have still to find a really good way for. *One way of looking at it as well, is to make sure that you're learning has relevance for the real world. Which you do simply by picking the right materials and teaching the right things.* So that instead you might want to say "well I want you to associate this piece of knowledge with an imagination of yourself in the real world using it". It's more *that* route that we're going down.

When we look at how we put content together for our courses, we strive to teach you things that you can see yourself using, rather than teaching you something which you would never hear anyone say.

What main challenges do you see the front of you as a learning designer?

Well I know that Memrise has a lot of work to do on incorporating training competences in language learning. In order to create a holistic language learning experience specifically. So I think we're doing something really really well, and then there are things that we don't do at all. Things like *making* you speak we don't do at the moment, and training you how to pick things

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out, or things like bigger audio input and presenting you with things that you had never seen before. My job is to find a way of how we are going to do that in a way that is easily digestible for the user, and is something that makes the user trust the app as an enjoyable pastime as well as a study tool.

It sounded like there is a huge link to the use of technology.

Oh yeah, most definitely.

I also wanted to ask how the users muster the skill - in this case language learning - in the best way? How did you approach this?

Well, so that's always the ultimate test: basically just to drop someone down into a little village in the country where they have been learning the language from, and see if they 'manage'. That would probably be the ultimate test. So I guess it's a little bit of a straightforward answer, but I think that's just true. To some extent you will never learn what you're trying to learn until you're forced to do it. So the situation has to require of you that you are already able to do the thing that you're actually trying to learn - which is a bit of a funny way around it. So if you wanted to find out whether you could bake a cake is to actually bake it. It's the same thing with language, if you want to know whether you manage with a foreign language than the only way to do it is to go there, use it, go through it, see how you fare.

But as you mentioned, you don't quite force users to do that yet.

We don't *yet*. We *do* force them to do what we expect them to do, or what the app currently expects them to do, which is to remember words. It's difficult to get anywhere with language if you have no words. *If the ambition of Memrise is for people to be able to function with language not just in terms of being able to say the word, but rather to understand and recognize them on the screen – which it is – then we would have to have some way of simulating that experience.* Not that I have a clear idea of how to do that, but I think it is possible. Or we would have to have a way of enticing them to do it - call them up, have a chat with them, and find out whether it works... But there might be another way of doing it right. It's definitely the case that if your ambition is 'having taught them these things' and 'they should be able to do this', then the only way of finding out whether they can do that is to make them do it.

Which platforms are channels work best for learning? Meaning, some people believe the mobile is most effective because you actually tap stuff, and the others believe that it's desktop, but I know that you guys have like both apps for both mobile and web.

I don't actually know if there is a difference in our app on mobile or web, but I would assume that there is. But that's because we have a functionality, which means that you have to type everything, and you only type certain things on mobile - so it's a little bit difficult to compare that. I think, potentially, *mobile is better because it's more accessible, so you try to do it more.* And I would otherwise say *web because if you sit down with your laptop, you already go into a space that's more focused.* So it's the same thing with job applications; I went to an event the other day, and the guy said that they realized from their data – they were a recruitment company I think – that people browse job applications mostly on mobile devices, but when they actually write the job application they do it on a laptop. So you could have the same argument about learning; *a mobile platform is better for learning because you're more likely to be doing it more, and on the go, but if you were in a laptop situation, you would maybe do it less, but you'd sit down a different way.*

**Appendix 4. Interview with Dr. Lina Yassin (Charité – University Medicine Berlin)
from March 21, 2017**

What would be nice to learn from you today is what are the best strategies for e-learning. The other thing that I'd love to ask is, you mentioned that we should have a psychologist on board. Why this role specifically?

I gonna show you the presentation that I did yesterday for my project for Arabic Language and Arabic World. With my neuroscientific background, this is something that I still do. I have a school for teaching Arabic and building a community.

Just because you mentioned that, we only get to know 10% of the things that we read, and more if we see and hear it which would give 50%, and if you get to discuss it, it'll give 70%, if you experience it you bring it up to 80%. And then if you teach it to the others, it'd be 95%.

I was using yesterday this example to discuss and to play game, not to be shy and think that I'm the expert and I'm showing them something. I'm interested in learning. *We get to remember 50% when we see and hear. We should always think of activating the parts of the brain which are on the back, which is for our visual representation, and then the temporal part of the brain which is responsible for audial representation. And the moment when we make the experience run between those two, it can enhance learning.* And it's true!

What I call "learning" is when two neurons suddenly start fighting together. You hear something, and now because you hear something again, those two neurons that "heard" it before get closer to each other, when you hear the same thing for the 3rd time, you really remember it, and then you can recall it.

So what I can contribute to your endeavours is really to tell you what's the basic understanding of learning: *"what is memory?"*. When we say that we remembered something, sort of what does it mean? *It's a synchronous ability of the brain in order to remember something.* But obviously you must also have motivation to learn something, and that's another part of the brain. So what I can contribute is this knowledge about the really basic comprehension of learning and memory - that's my background. I can put on a presentation and share it with you and explain to you the strategies.

Whatever we're building, it has to activate and evoke many sensations; so hearing, touching something, listening to something. You know *the fastest way of remembering anything is by linking it to olfactory cues.* We actually tell the students "if you want to remember in the exam, when you're studying this list of whatever bones or the brain, put in front of you an odorant – a perfume – and then take the perfume again to do the exam and then all will come back." So that's something that I would love if you can integrate it in the service you're building; how to *combine many sensation in order to boost this learning curve.*

Psychology is a big field. We are natural neuro-scientists, so that means we stick electrodes in the brain and we ask about brain-dynamics. But there is also psychologists who really think about what it takes to learn something, and to change a behaviour, and I don't really know how they do it – I know little about it. But when I said "a psychologists", I really meant someone who could take the learnings that we're setting and say how completely it is for people to digest it, to deal it; how impactful, how transferable.

But then can it be that there are different kinds of types of people, some people who prefer one type of learning strategy and others who prefer the others because it's easier for them? Is it this kind of matching?

Yeah. As I said, I teach kids, and I see how *we switched in our development as human beings from auditory learning to visual learnings.* Meaning, for examples, because their brain is still developing, *because the auditory part of the brain is taking the most space, kids tend to learn things without visualizing them.* So when you teach then a new word, they just hear it and remember the tone and can reuse it. *And we came to, by time, rely on seeing.* So we have to see it

and hear it in order to learn it. But oddly, there is still the adult who prefer to, when learning a new word, write it down, look it up, and read it. And there are those of us that it's enough for

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them to just hear the word and then they will remember it. But *in any compilation, or strategies, try to think of all those steps. How do we offer them, when hearing alone, when it's seeing alone, when it's hearing and seeing, and when it's more of an interactive.*

About the use of audio. It is not very effective on its own, but they do ask you to instantly try it out, so while you're listening to the person, you are trying it out straight away. And so I was curious, what is so effective there? Is it the practical aspect, that you instantly train it yourself? Because audio on its own is not so strong, but if you practise it is all-of-the-sudden becomes a proper learning experience.

So obviously you can do one thing right at the first encounter – and this is what I do. For example I teach people they should think of memory as a clap. You clap, and then you hear another clap, and that it starts clapping, and then it's a cascades of clapping. And at some point it becomes so synced clapping that that is where the information is stored. But if you just clap, what happens with memory is that you're clapping and another person is clapping, and it takes some time – there is some delay – and when you clap for the second time, this other person gets closer to you. So whenever you clap now, there is a higher probability of the second person clapping as well. *And if you do it three times, now this person is so close to you, that when you start clapping it's automatically – its instantly happening, the delay becomes minimum.*

So is it then repetitiveness that makes that kind of minimal delay, or reduces the delay?

Yes. *What happens is that by learning you really reduce delay, and once it's really matching – once it's synchronous – then it's like maximum learning, and you can experience the things you have re-experienced, without having to think about it.* So that's the idea. What are our neurons doing when they remember? They really sense some extra part of the neuron, the axon or dendrite, and *now the two neurons are closer together, so they synchronously fire.*

In Berlin we have a start-up that is called Memorado, part of Glumosity, that claims to train your brain. They claim our *brain is like a muscle, that you have to train.* Like you go to the fitness, and you have to train it. And *you also have to train it in some kind of periodicity; you train, and you rest, and then you make the next a bit more intensive, and then you rest.* Because you can't just saturate your learning. *If you read all this material at once, it's not going to happen.* Because the neurons will be fighting for their capacity for building new connections and new paths. *So whenever you're teaching something, you also need to think about “in which interval am I teaching it?” and “how many courses do I have?” and “what's the intensity of the second level of learning, and how different does it have to be to the first?”* Because *it has to be gradual.* And then you have to stop, and you have to *go back and check “did you learn anything there – anything you were supposed to learn?”*

I'll share with you another example. I have an eight year old son, and before he was born, I got myself this book of “what to expect when you're expecting.” You learn about what to expect when you are pregnant, and then after I was done I couldn't really... it was a book of course – so I thought “okay, but I really still need someone to tell me”. Not my friends, not my family, I wanted some experts. Later I turned on to a website that was called Your Big Baby, or something, and I was getting a *daily* newsletter – very short – about how to compare your child's development to other children or what to expect. And I found it really very very helpful. Because I was always referring to this newsletter, to this email that I'd received today, and checking “hmm, is my son okay?” It also had some tips on how to encourage him to be. Anyways, now back to your course, *offering some kind of newsletter – but not a classical newsletter, more like a daily chunk of things; how to deal with a dementia person – has to be auditory and visual, but it has to be in similar chunks. So not a course. Not a book. It's a chance to be overwhelming. It has to be of tips and advices, more interactive.* Definitely there has to be some kind of interaction where you can chat and ask online. Maybe not only a forum, a platform, but also some kind of a community. We have those tutorials, and then you have the chatroom, but then you also have expert.

About that, actually, I see many learning services that implement those communities. For instance I was taking a lot of online courses, and on the NovoEd classroom it's for free, and there are often nice courses. The thing was that when I started using that, I started

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noticing that they are almost forcing you to execute it in a team. So you're lucky if you have, for instance, a partner who is interested in learning the same thing, or a friend from school, or whatever. But, what was the case is that there are often people coming to you and knocking like "hey, would you love to join me, to work in a team." And those people can be from anywhere in the world -

Yeah, that can be quite annoying.

Yeah, exactly. That's what I'm saying. So the whole community thing – do you think they're building it so people can start a discussion? Because I have a strong feeling they are misusing it somehow as well.

I'm a big big fan of personalized learning. That is a thing that fits me. I'm even a bigger fan of community learning. Especially when you have a person with dementia, and you feel like "Oh, I'm the only one really having to deal with a person like this." And then notice that there are actually plenty of other people that deal with this that support each other. So I would actually advocate for community learning, for a community service. But maybe in order not to drawn into this forced group-making, this requirement to the community has to be optional. Even now at medical schools, we are tending and leaning into having the students come together in groups of eight, and help each other by learning. So I absolutely think that personalized learning is something you can do at any place, but it's much nicer if you have a community learning with you and supporting you.

Do you know design thinking? In design thinking there is the whole persona analysis; "who are you developing this for?" I think that in the beginning, you have to really come up with different personas, and then choose the persona that you want to build it for. So *to make it more user-centered, we have to come up with a persona. But before that, we have a spectrum of different personas that are learning in different ways, which is a very viable thing.*

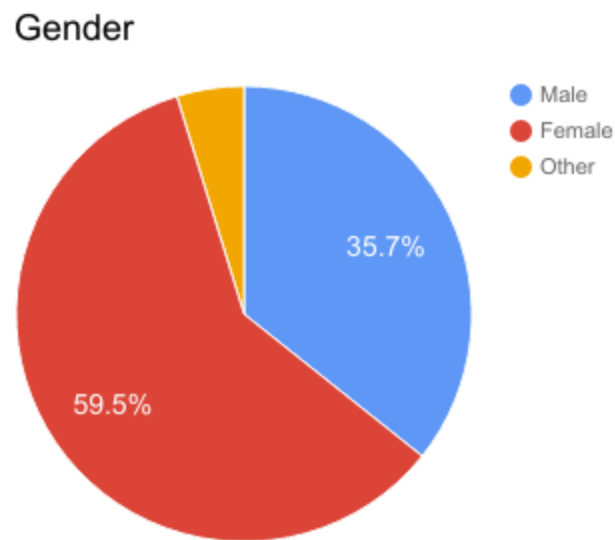
I'm also very happy that there are people, like you, who take the things from their working environment and finding more impactful, non-business, projects to work on. Then, hopefully it moves into being a business and profitable for the idea behind it in the beginning is to impact.

Appendix 5. Service analysis and classification

	Interac- tivity	Omni-chan- nel support	Learning style sup- port	Learner types	E-learning type	Educa- tional plat- form
Babbel	High	Moderate	High	Deep, Sur- face	Blended	Subject- based
Coursera	Low	Moderate	Moderate	All	Asynchro- nous	Generic
Duolingo	Moder- ate	High	Moderate	Strategic	Blended	Subject- based
Envato tuts+	Low	Low	Moderate	Deep	Blended	Generic
Google Primer	Moder- ate	Low	Moderate	Deep	Blended	Subject- based
Headspace	High	Moderate	Moderate	All	Blended	Subject- based
Lynda	Low	High	Moderate	Deep, Strategic	Blended	Generic
Memrise	Moder- ate	Moderate	High	All	Blended	Subject- based
NovoEd	Low	Low	Moderate	Surface	Asynchro- nous	Generic
PerfectEar	Moder- ate	Low	Moderate	Deep, Sur- face	Blended	Subject- based
TED talks	Low	High	Moderate	Deep, Sur- face	Synchro- nous	Generic
Udemy	Low	Moderate	Low	Deep, Strategic	Blended	Generic
Yousician	High	High	High	Strategic	Blended	Subject- based

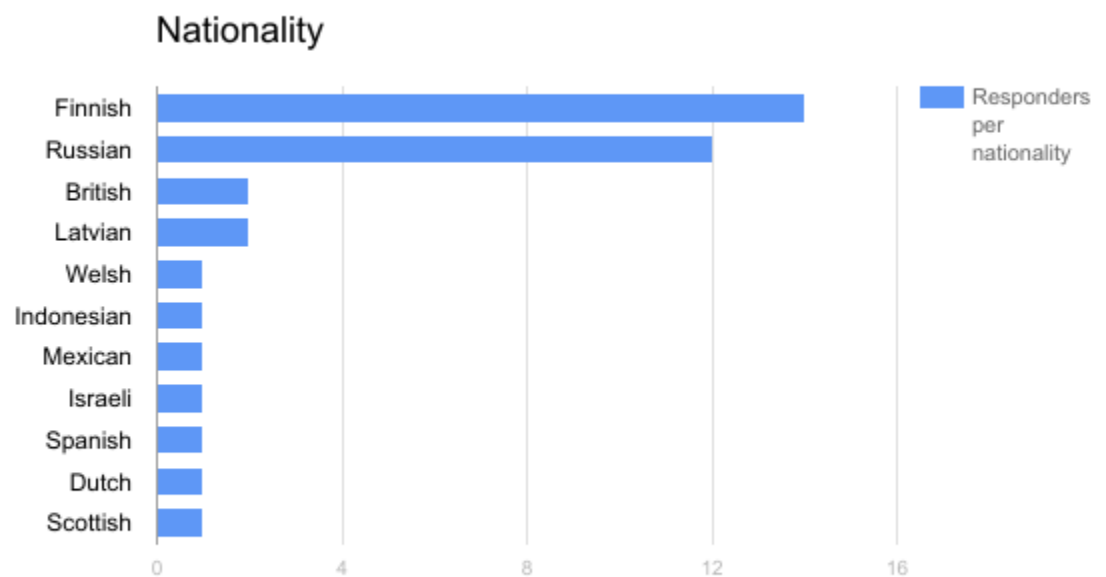
Appendix 6. User survey on learning results

Gender:



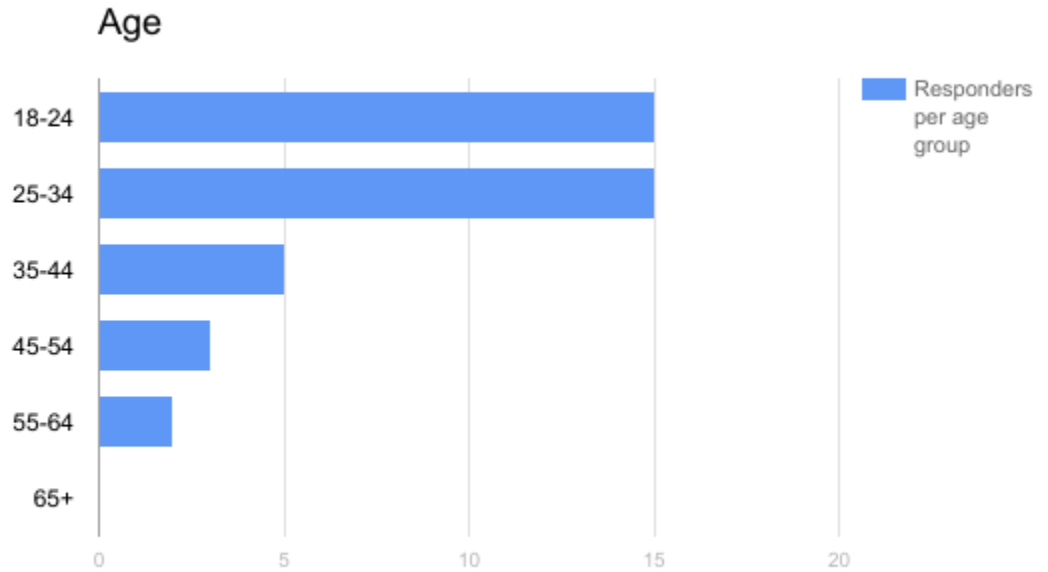
Majority of the responders are female.

Nationalities:



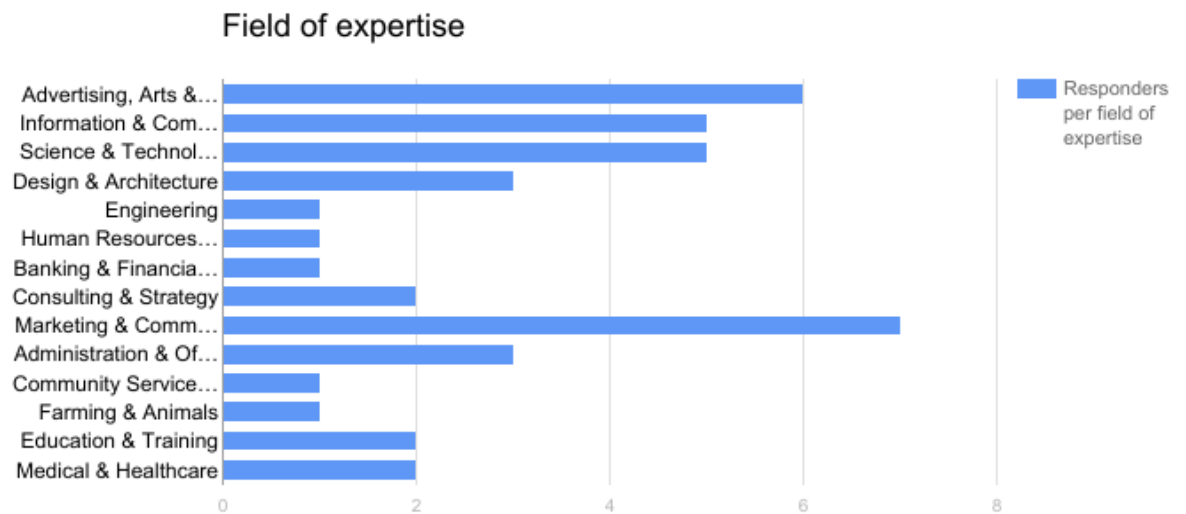
Even though the survey's been published in international communities on Facebook, majority of the responders turned out to be from Finland and Russia (Eastern Europe).

Age:



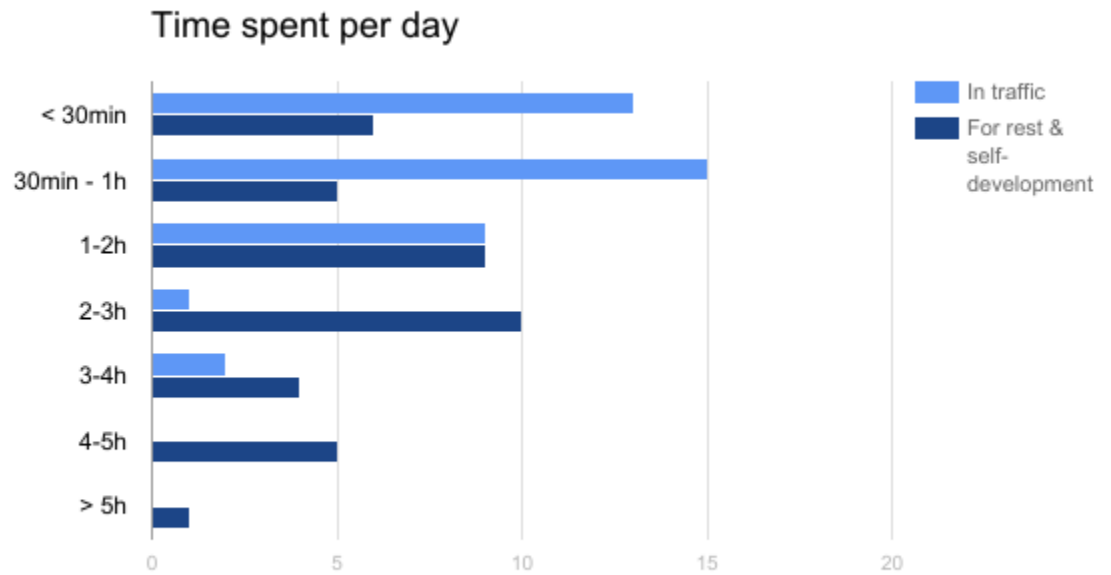
Majority of the responders are young adults, ranging from 18 to 34 years old.

Expertise:



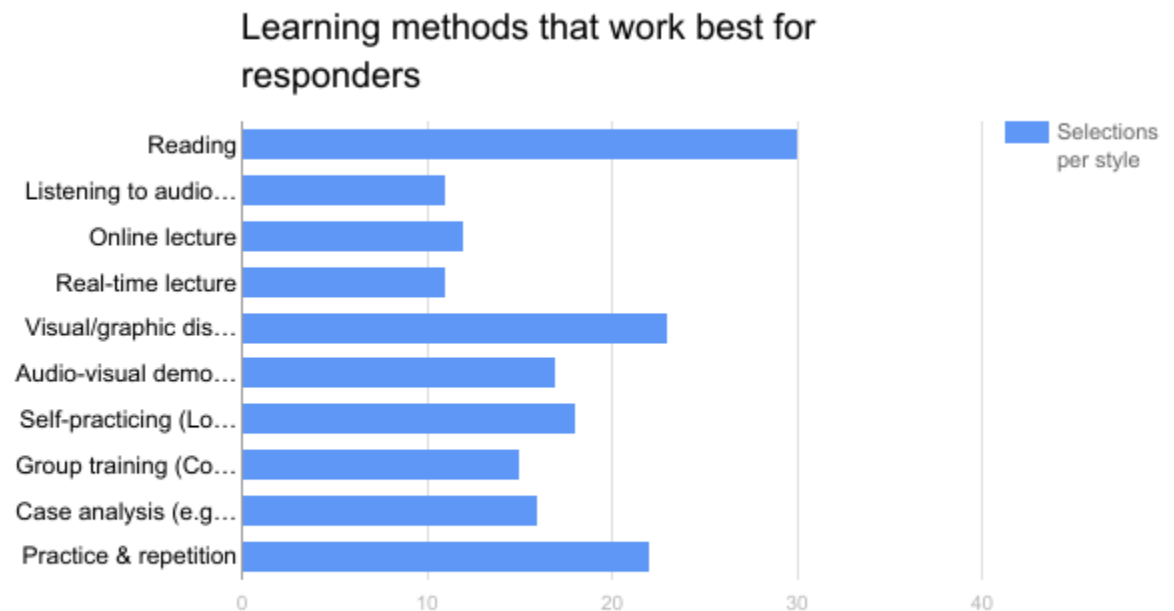
The majority of the responders are specialising in Marketing & Communications and Advertising, Arts & Media, which could have influenced the way they view and analyse e-services.

Time spent in traffic & for rest:



The majority of the responders are spending 30min-1h in traffic, and are dedicating 1-3h of rest and self-development a day. This time ranges could be considered when designing the class durations.

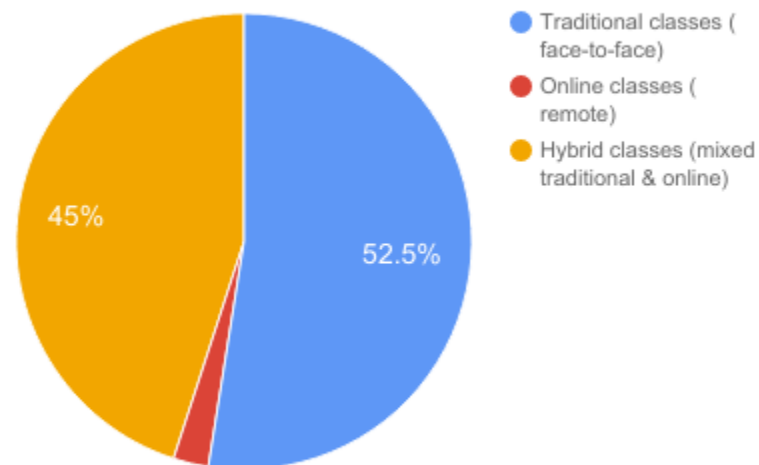
Learning styles:



As for the learning methods, responders believe that best ways to learn are by reading, looking at a visual/graphic display, or by repetitive practice.

Class formats by effectiveness:

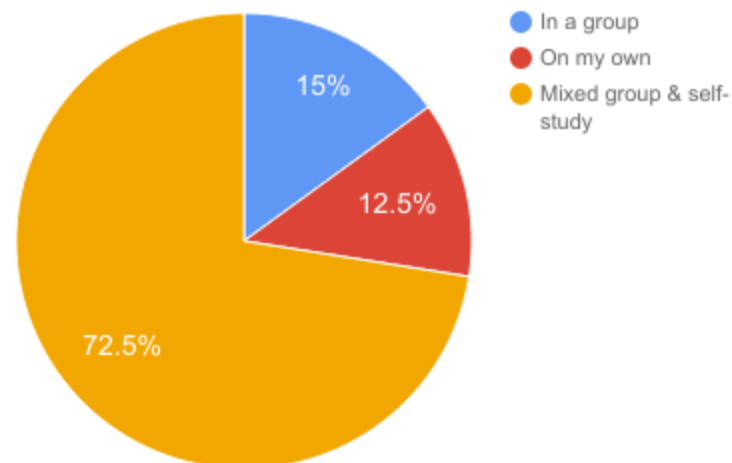
Class types by effectiveness



The majority of the users believe that the most effective classes are the traditional ones, where students meet face-to-face with a teacher and share group tasks.

Class formats by personal preference:

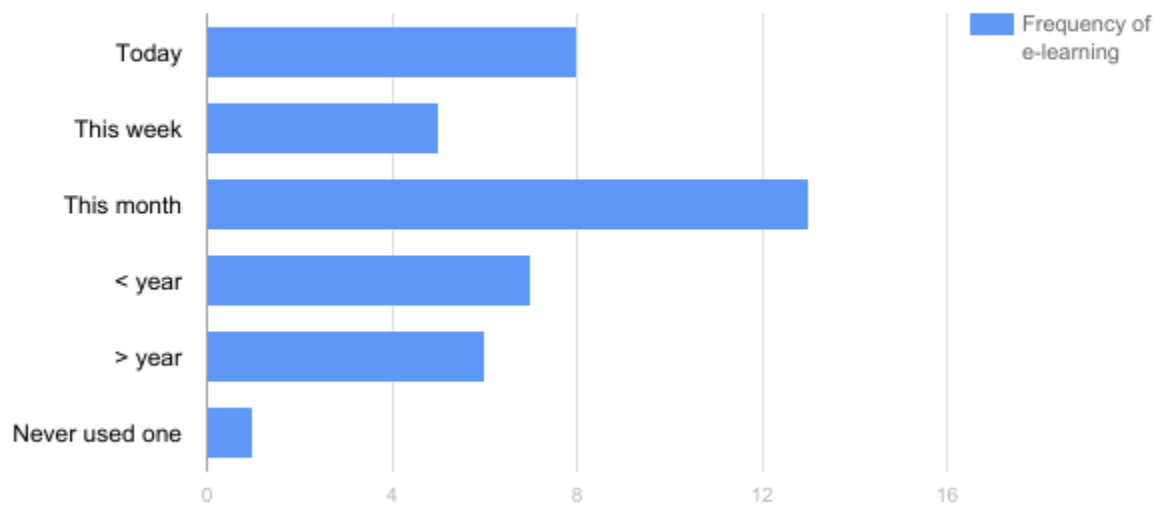
Points scored



As for personal preference of the learning format, the majority of the responders chose mixed group and self-study.

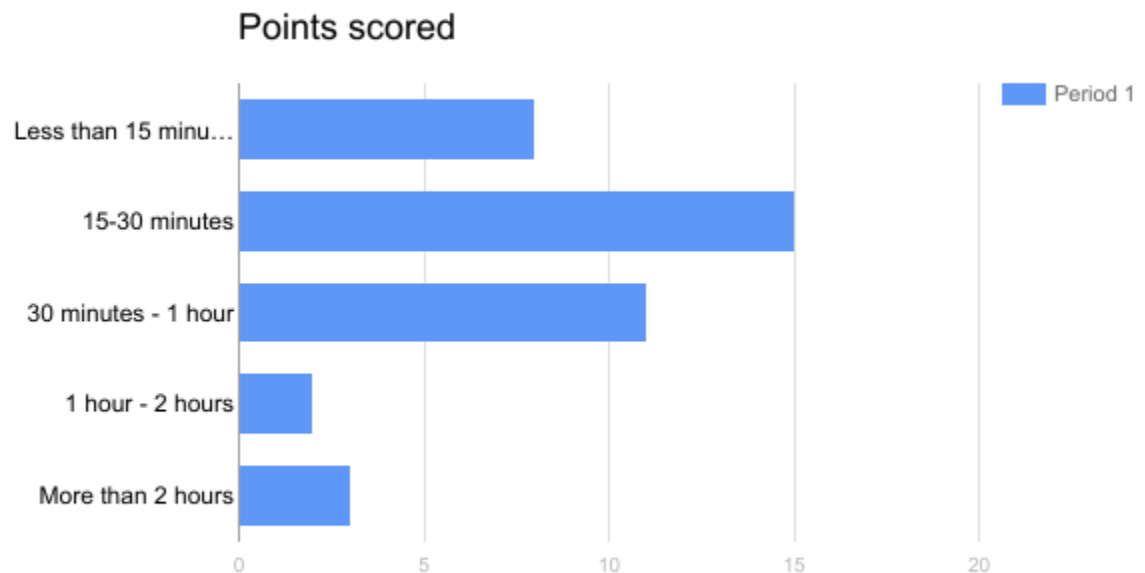
Last time of using an e-learning service:

Last time of using an e-learning service



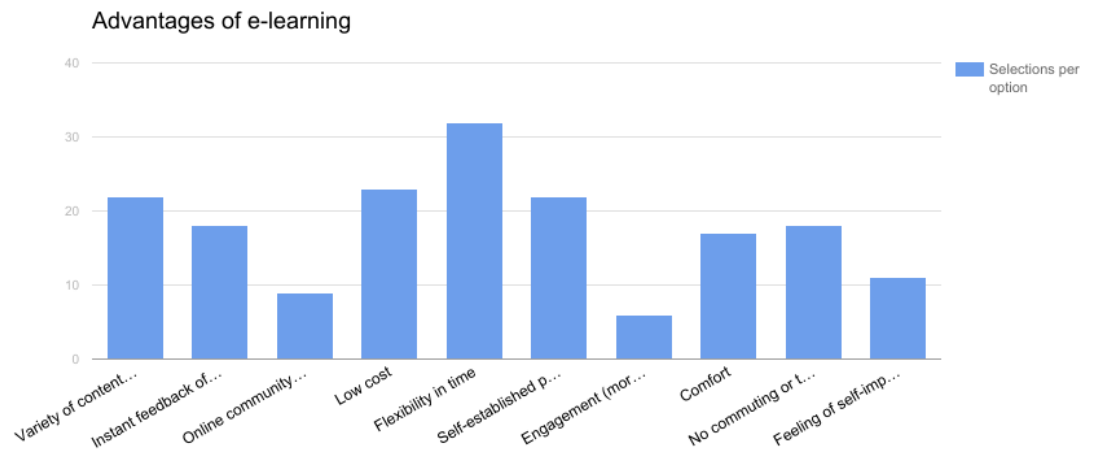
When most of the responders were asked when they've used an e-learning service last time, turned out that for the majority it's been this month, and the following group shared that they used it today.

Time a day on average one spends/would spend on e-learning services:



The responders can only dedicate 15-30 min a day to e-learning.

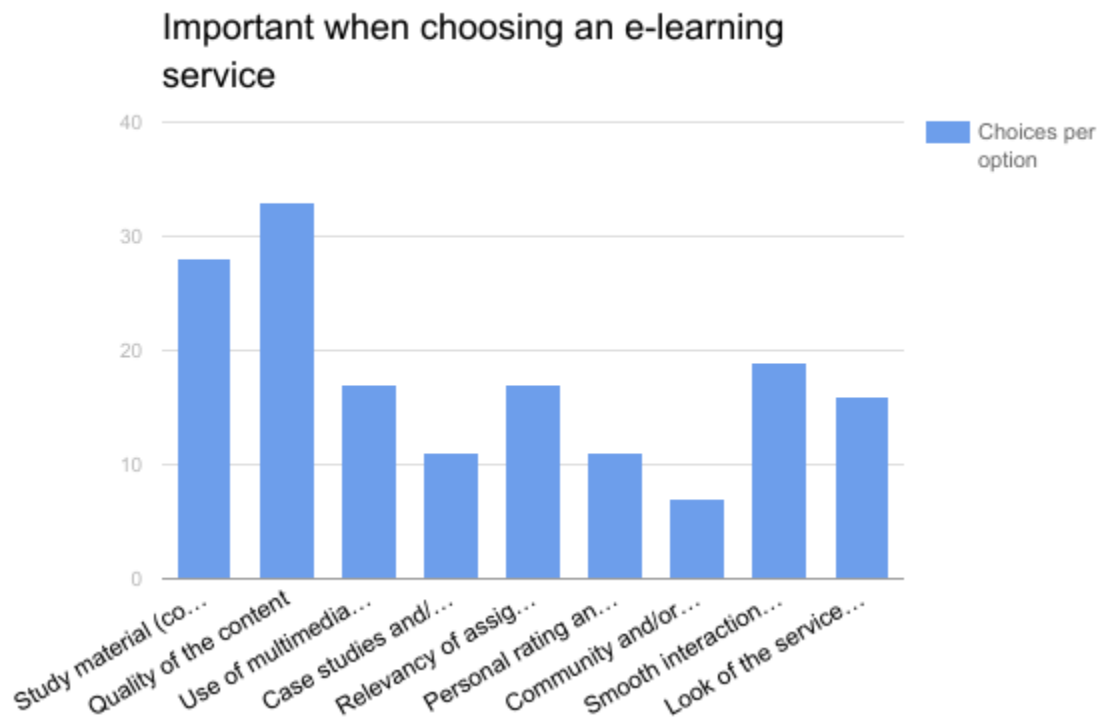
Advantages of e-learning:



No time wasted to re-explaining or people coming late

Many responders find it beneficial that e-learning services offer a flexibility in time, often come at low cost, and offer a variety of content.

Important things when considering an e-learning service:



Lecturer info/backgrounds

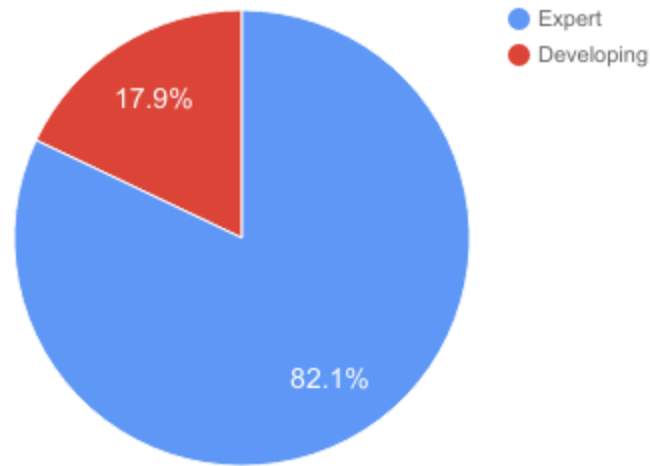
Cost

When asked what's important when choosing an online course, people shared that quality of the content and study material & curriculum matter a lot.

As for the following options, smooth interaction, use of multimedia, and relevant assignments were also noted important,

Use of modern technologies:

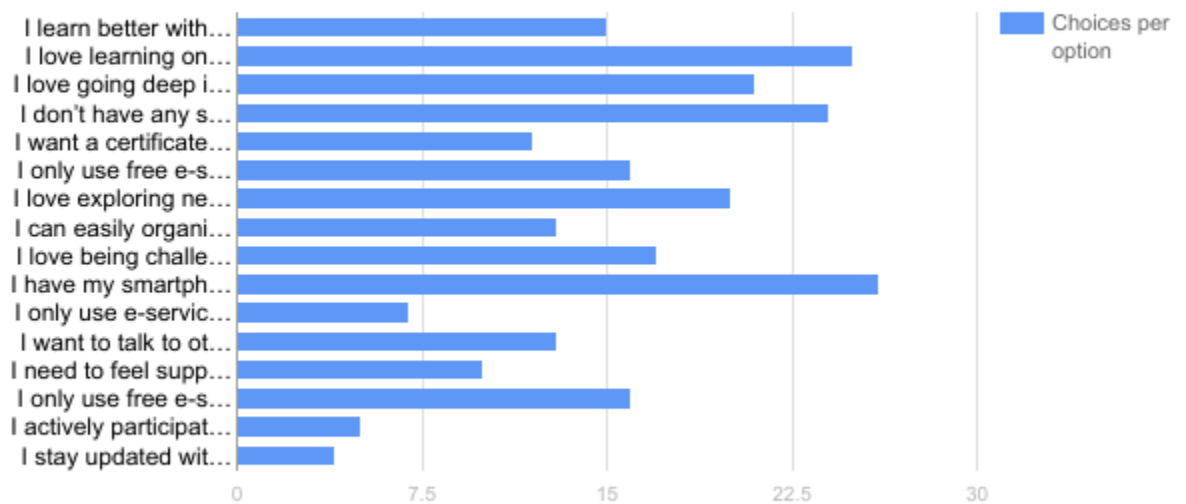
Use of modern technology



Majority of the responders are proficient at using modern technologies.

What is true to our responders:

Profile of our responders



When the responders were asked what statements are true for them, the majority of the responders shared that they have their smartphones near them all the time. Further popular options tell us that the responders prefer learning on their own, that they don't have any sensory disabilities, and that they love going deep into the subject.

Last learning experience:

What's been done well:

Chat rooms to discuss the subject with lecturers and other students. Animations of the brain Case studies - "virtual" families.

Read or watch course , mini quizzes throughout, then final test at end.

The presentation was bright colourful full if written information re self harm at the end of each section was questions to help remember the information

THE mix of text and audio

There were no deadlines; I could submit answers at my own pace, and after every task I was evaluated with a message from the teacher.

Given lessons were explained and demonstrated well and clearly.

interesting and entertaining examples and tasks, ok visuals

Clear tasks with proper description

It was simple enough to follow and it was short enough. Nothing extra or a boring voiceover.

explanations with examples

App usability.

I took a course on Coursera that had a lot of practical assignments that had to be completed to pass the course. I liked being forced to apply concepts to real cases.

Nice UI, interactiveness

Different kinds of tasks (learning a language)

Feedback of my exercises was given quickly.

Presentations and content (partly) were great, as for the first, you could turn to them if needed and refresh everything's learned. Content should be actual and more detailed, so you could learn something deeper than it happens in my experience.

I was learning how to work in AutoCad and it was pretty good, I watched YT vid. Voice was calm and slow enough

Excellent connection and a knowledgeable teacher

I can do everything with a spread which I can and needed me. And nobody's hurrying up me

Registration

Online classes once a week Personal tutor, who helps you with problems/questions

The information was structured and well represented.

Online learning platform has helped me to stay in a shape of responsible person (because, as a rule, we had deadlines on each subject, which we had enrolled).

There was a detailed step-by-step process illustrated by both pictures and code snippets(it was a programming related tutorial) and in the end provided the full finished code for comparing to your own.

Videos combined with whiteboard drawings. Short clips gave sense of progressing fast.

The video was clear and content and short enough

Short videos and practical training after each one

Very intuitive, and good design that helps you go through the exercises without feeling bored

It had clear instructions with synced visuals.

repetition and practices

Students found the following e-learning service features good:

Community live/virtual get togethers

Well established learning flow and relevant and diverse checkpoints/tests/summaries/questions in the end

Mix of learning methods (e.g. text + audio), whenever demonstration is clear

Personal pace

Real-time challenging practice with immediate and relevant feedback

Short clips for smooth progression

UI & flow that guides the student forward in an entertaining way.

One thing to improve:

Probably several years old. Material contents did not change all that much, but the presentations or videos needed updating. Keep it current.

Be with a group of people in real life doing it on line

Too many useless exercises, but I guess this doesn't really have anything to do with the e-learning itself, it was a problem related to course content.

Always give practical examples on what you are talking about

the price/the duration of the deal, (I didn't need the app for as I had to pay for it)

Answer times, some times minutes some times weeks

I would turn off other web services

The lack of fresh content.

I always need to be held accountable if I am online learning. It's too easy to drop out, so something to encourage continuation helps a lot.

Add more specific courses

add interactivity

More engaging learning materials.

More examples and practices, of course. Learning has no sense without them.

I would write more notes

To chat our teacher or someone else to ask something which I disinterested

Knowledge testing system

To have Less grammar exercises of the same type

I would like to add plagiarism checker in e-learning service.

I would try to document my own experience more in the form of notes, because for some reason the online lessons don't seem to give me the same urge to take lasting notes as traditional lessons do.

The UI of the service (Udacity) was not fluent. I used Chromecast to screen the videos to my tv, but the user interface on the phone was a bit confusing when I used it like that.

Practical training would be better if was done on my own project rather a random case

No exercises using voice or audio

Some not very important details were missing.

i would have liked to focus more on what i wanted to learn (in this case writing a foreign language rather than translating or using existing word blocks)

Not have to read so much on-line

Other comments

E-learning is a great way to upgrade your learning but it is also a pitt which some content providers exploit. People should be taught how to avoid there exploit courses.

I generally dislike most e-learning services as they give you trophies without really testing you, and thus the "satisfaction of achievement" feels fake

It is important as well, how fast and emotionally does the speaker talk. And it is important not to see him or here at the screen because of the human factor.

Students think that the following things could improve:

Outdated content and/or materials

Irrelevant case studies & tasks and undeveloped means of practice - people want their real cases to be applied

Unfixed feedback/answer times

Lack of properly developed motivation and engagement to continue (e.g. earning trophies for nothing reduces motivation)

No proper testing system

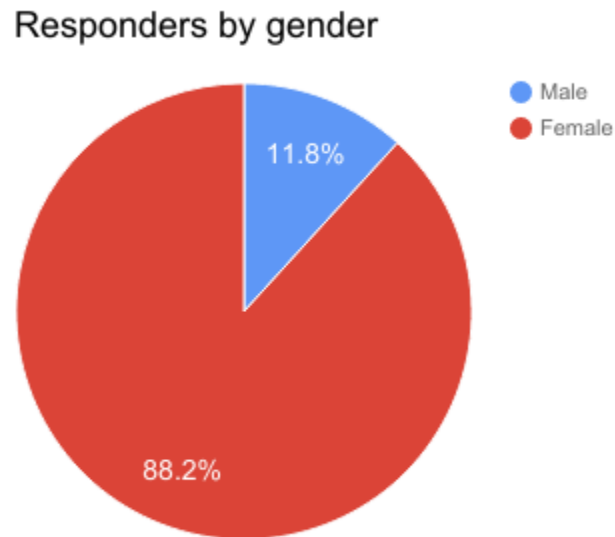
No notes taking systems

Bad utilization of modern technologies (e.g. voice recognition)

Unestablished and unconsidered students' learning goal

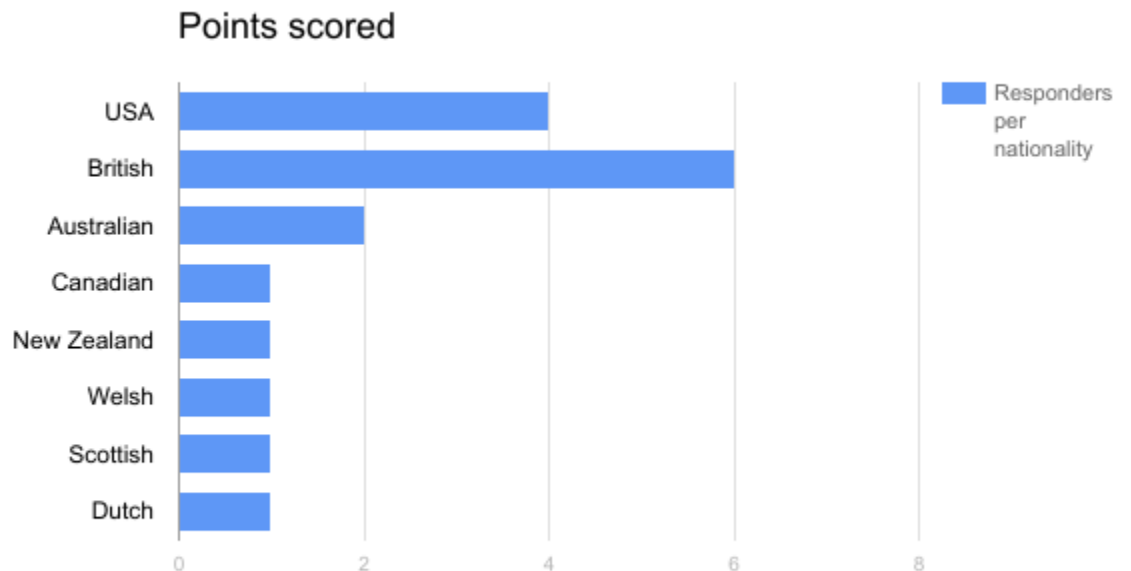
Appendix 7. User survey on dementia caregiving

Gender:



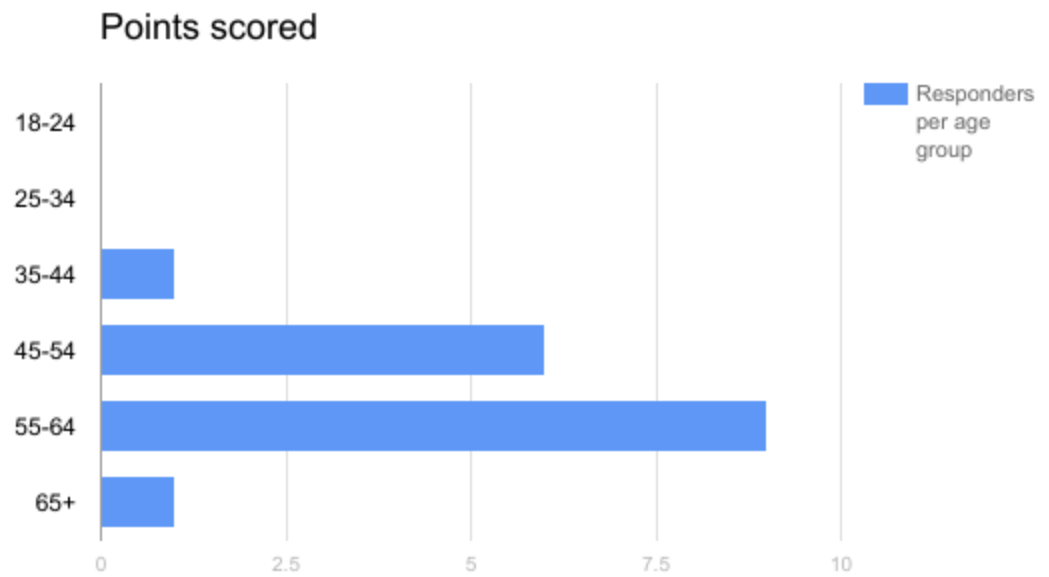
Most of the responders were female

Nationalities:



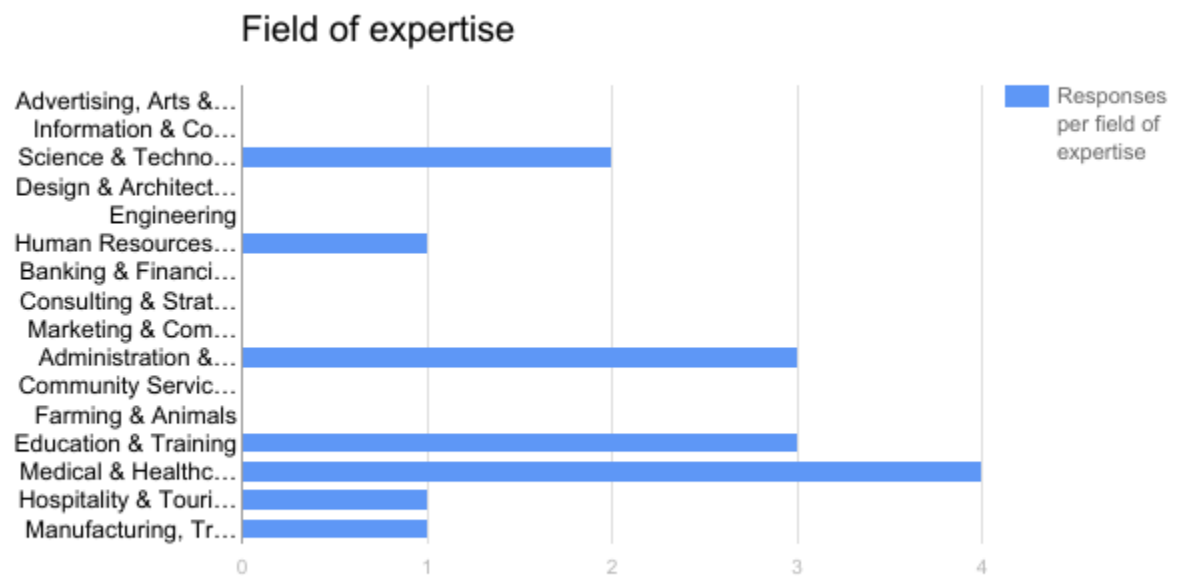
English speaking people are most active on those Facebook communities where I've been seeking answers, therefore building a course in English would come beneficial.

Age:



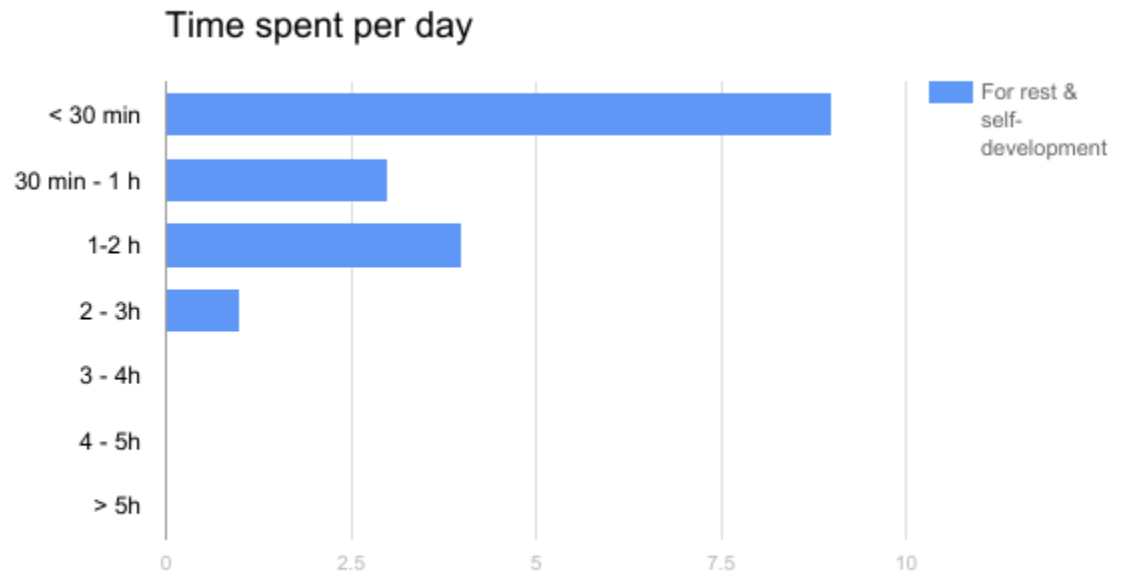
Most of the responses were collected from the dementia related Facebook communities, where the following age groups of 45-65 years old were the most active replying. Assumption: most of the people who deal with PWD are from those groups, and are therefore our target users.


Expertise:





A majority of the responders come from the fields of Medical & Healthcare, Administration & Office Support, and Education & Training.

Time spent for rest:



 **Sandra Heald** Do you really think we have time for elearning? 5 minutes on google is the most I can manage ✕

Like · Reply ·  1 · 4 hrs

 **Anastasia Kozina** Hi Sandra! That's exactly the type of information I've been trying to gather, so thanks for the comment on the first place. I think it's already stressful enough to make any of you study a course that takes 5 hours a week, and if anything that's also very unfair. And unfortunately that's the way how most of the e-courses work these days.

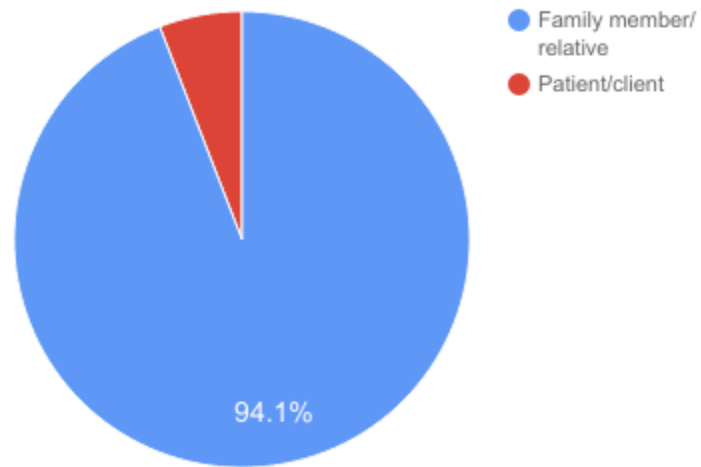
All I want to say is that there are ways to revolutionise the way how you guys can get information that you are seeking. And therefore my team and I will try to crack this one.

Like · Reply · Just now

People have less than 30 min a day to self-improve and relax.

PWD type:

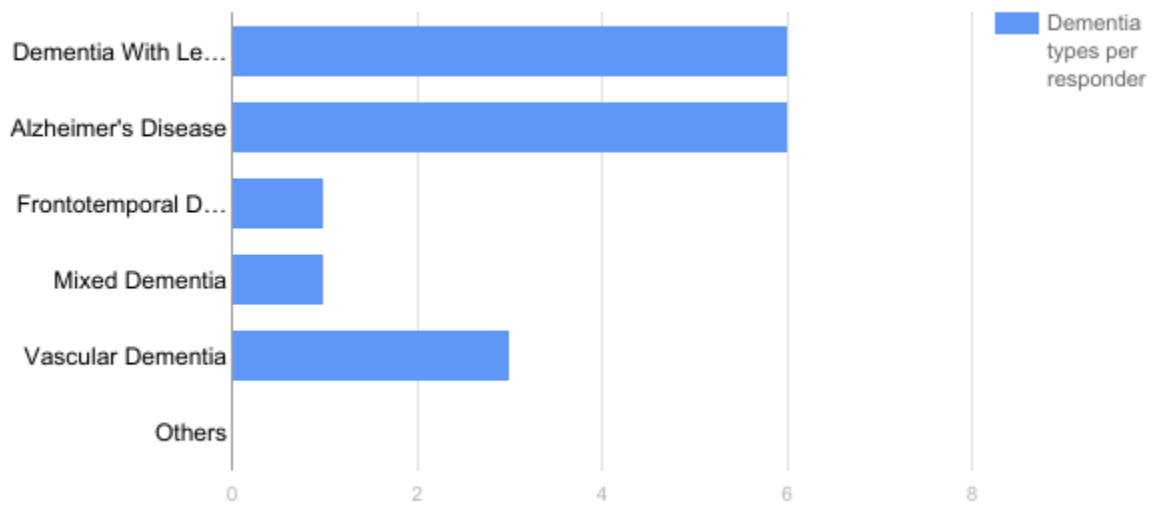
Points scored



Most of the responders are having a family member who has dementia

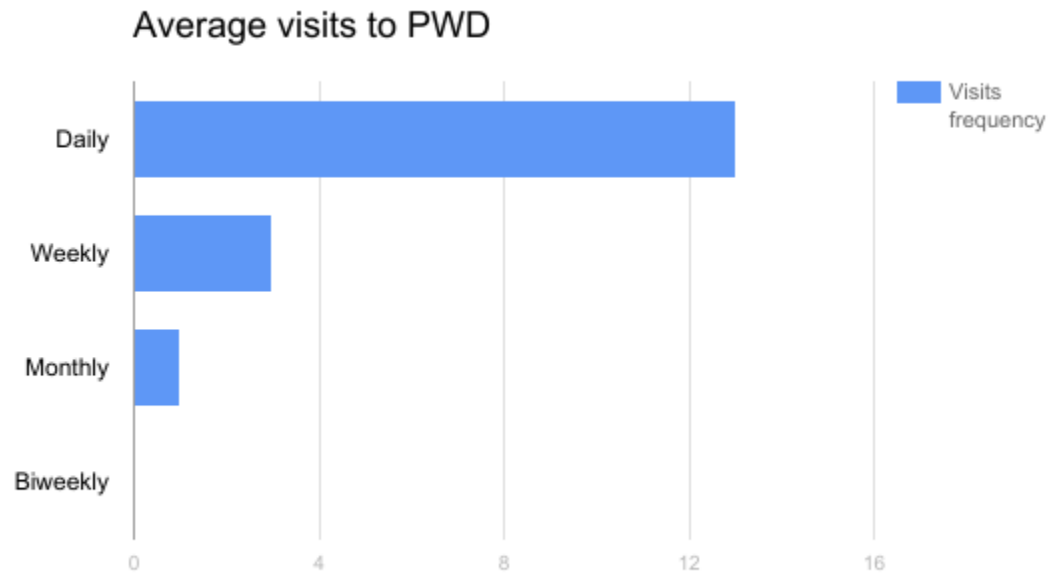
Dementia type:

Points scored



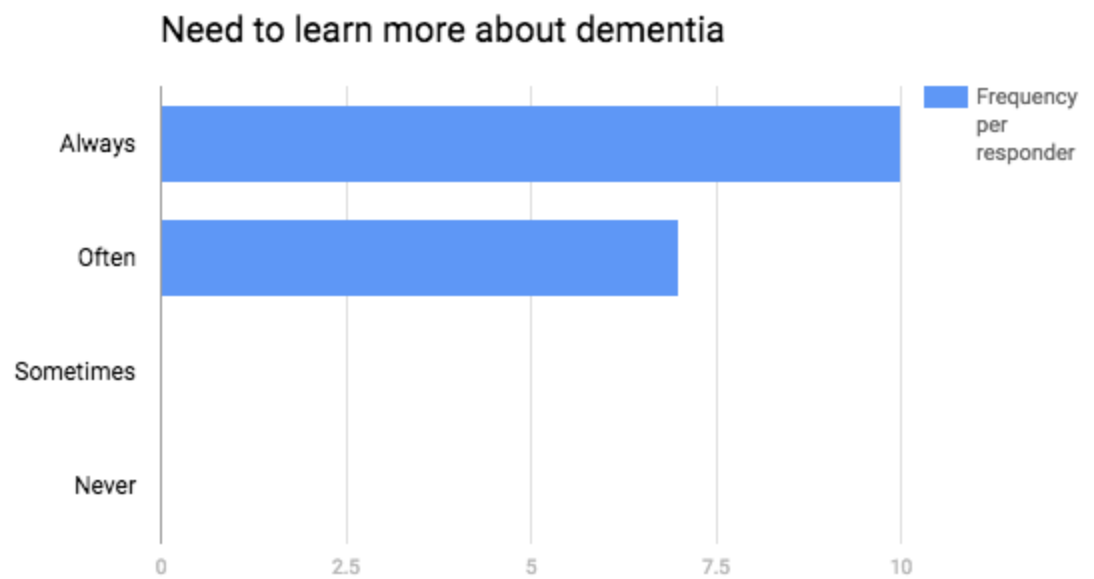
Most of the responses were given by those who deal with DWL and Alzheimer's types of dementia.

Average visits to PWD:



Majority of the responders would interact with a PWD on a daily basis.

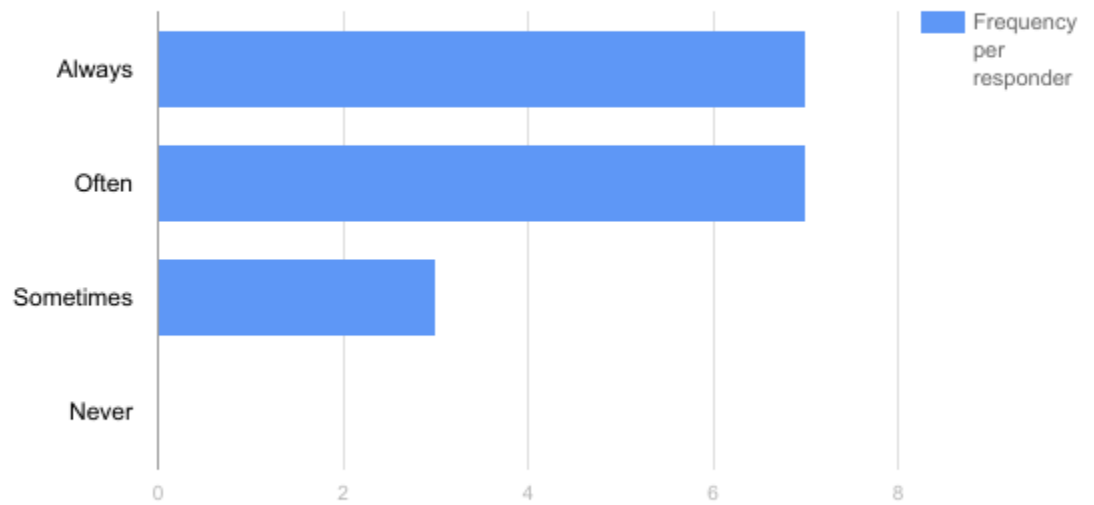
Feel a need to learn more about dementia:



Majority of the people do feel an urgent need to learn more about dementia in general

Feel a need to learn more about communication or interaction with PWD

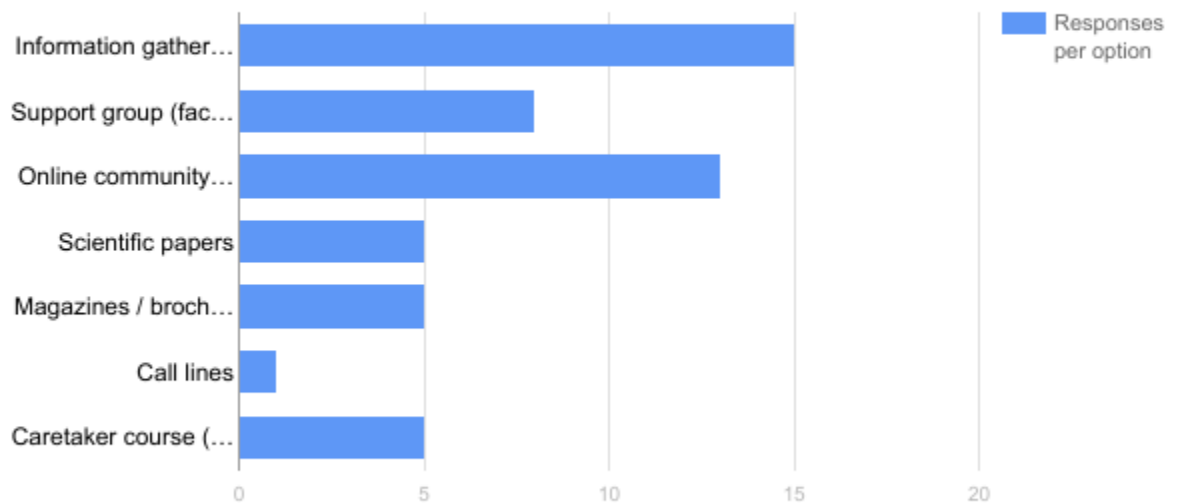
Need to learn more about communication or interaction with PWD



Majority of the people do feel an urgent need to learn more about communication and interaction with PWD

Information or help on dealing with PWD:

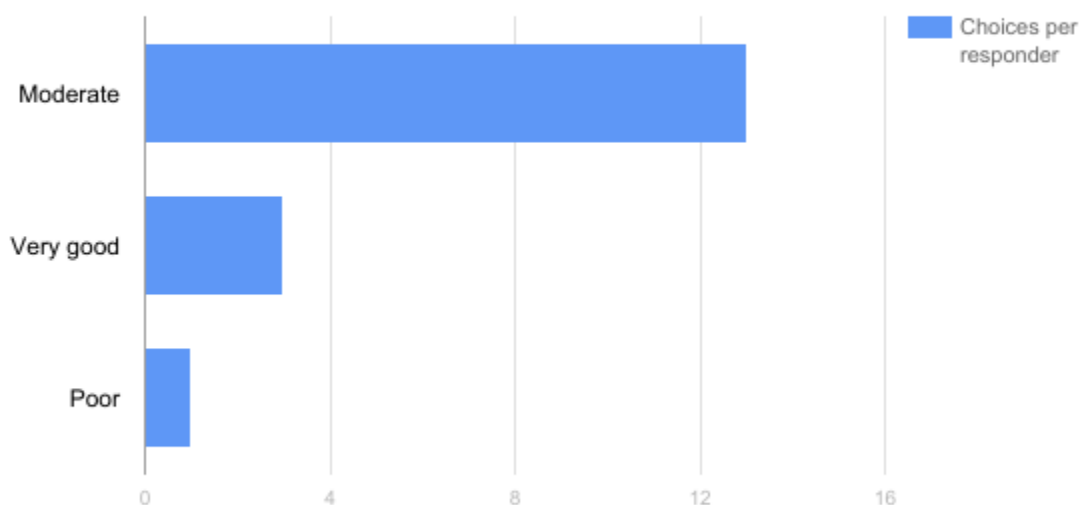
Information sources



People of the younger age groups are more inclined towards seeking information online, whereas older age groups are more inclined towards courses and support groups. Still, online searches or using forums/social mediums to get answers and share new insights is the most popular.

Understanding of dementia:

Understanding of dementia:



Biggest challenges/frustrations:



Louis Patterson Its hell...you live at your job 24/7 without a break or vacation without money and you get to watch your loved one steadily declining until they die...Dementia/Alz is the only disease where the ppl around the patient has the symptoms too

[Like](#) · [Reply](#) · Yesterday at 05:46

The mountain of paperwork involved and the financing

Losing someone you love, especially when they no longer recognise who you are.

Lack of services and understanding of dementia

The wide fluctuations in cognition are very frustrating. My other family members often don't see my dad when he is having a low point.

Lack of patience on my part

Episodes of confusion where personality changes mood swings

Getting used to dealing with behaviour then it changes, not knowing what might come next.

Lonely as I have lost the partner I had, repeating answers. Loss of mobility is an issue, he needs more physical care.

As the condition worsens how best to communicate with and support my PWD needs and ensure best care is given.

The hallucinations, agitations and decisions on meds

Having respite

Families! Lack of understanding in the community

Never knowing what the disease is going to take down on the PWD minute by minute

Mums mood swings happen so quick

feeling of not be able to reach the person or understand the need

How much to encourage to do things, if left to himself he sleeps all the time, but is capable of interacting more.

The biggest challenges include:

Emotional/mental struggles when dealing with the changes in the loved one (need of respite & support)

Communication thread is broken: inability to understand or communicate easily with the PWD (need to learn to communicate, interact, and get to a common understanding effectively)

* Formal procedures in care (need for a proper instruction and financial overview)

Image of a desired service:

Id like to see check lists developed to help with all of the paperwork both entering into care facilities and for end of life arrangements

Someone who you can consult with for guidance and support, how to deal with tricky Alzheimers' situations, how to deal with their behaviour, how to gear yourself up emotionally for the worst bits.

Co ordination of services with a named contact person

Long term care insurance for people already diagnosed with dementia.

More support groups

Respite care

Online specialist to newer questions A programme at rest homes that coul answer questions about your person. Carers are always busy so difficult to have conversation about what is happening and what to do.

Dementia friendly holiday places with respite on hand so can have some time together and some apart

Better tailored services for helping care for the PWD at home. It appears that there is more funding and support available once the person goes into care. And a need for legislated requirement of minimum number of carers to residents in aged care homes.

Agency similar to hospice BUT of course offered much before the end of lufe.

I don't know as every day was different

A really good info graphic for families explaining what dementia is and how it changes EVERYTHING. That the PWD isn't 'playing up' or being 'bloody minded'. That good nutrition is important and that the really, really cheap 'basics' meals won't 'do because they don't eat it anyway! '

Multiple choice questions on the best way to deal with situations.

Better education in dementia in general

A medical treatment that can reverse effects of vascular dementia.

Ideas:

Checklist of formal procedures, step by step

Course/guide on PWD behavior and how to understand it

Long-term care insurance for the one diagnosed with dementia

More proper support groups as well as professional nurses who'd shed some light to confusing situations

OR online service that's do the same

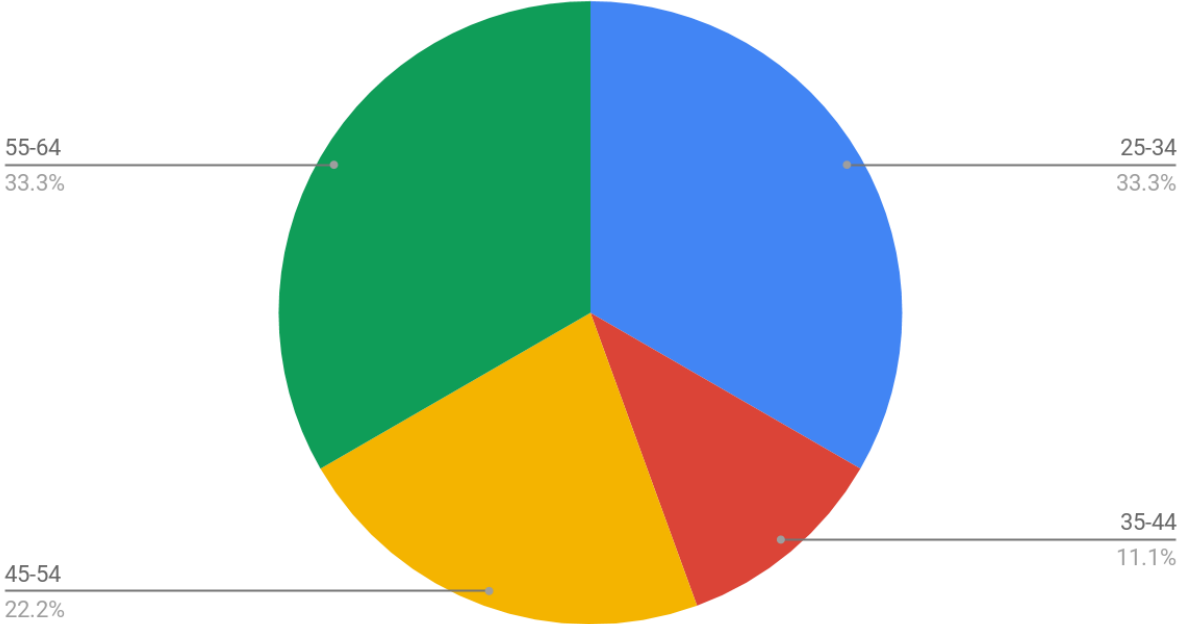
Dementia friendly recreational places

Better education on dementia (online service, infographics that would explain how dementia affects lives of others)

Medical treatment and development

Appendix 8. User survey on professional dementia caregiving

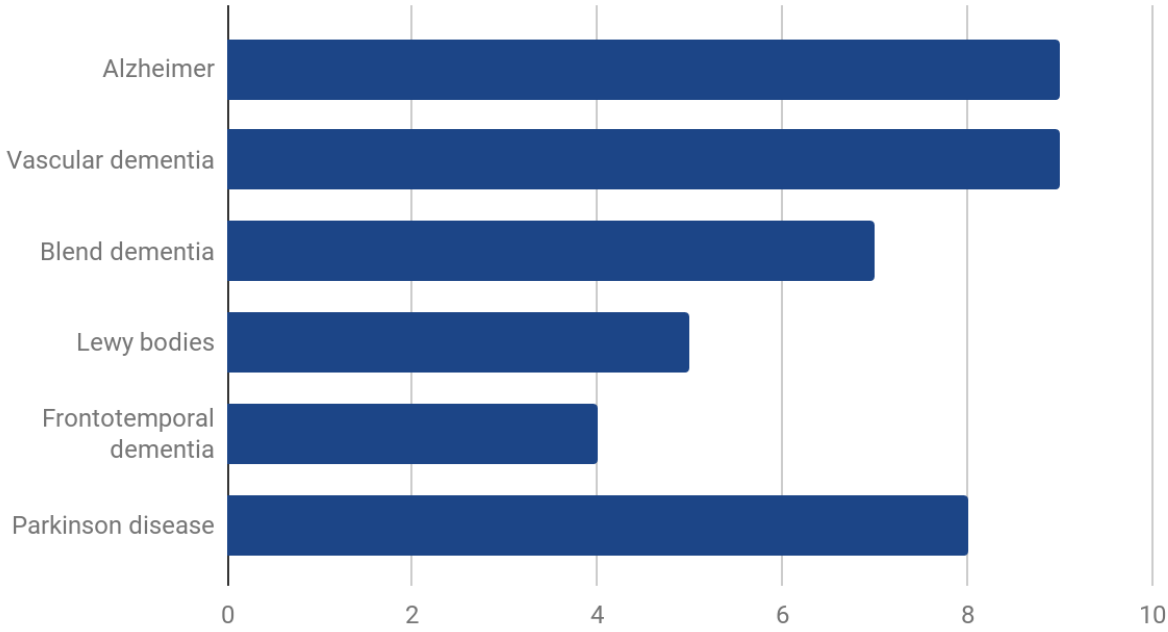
Age



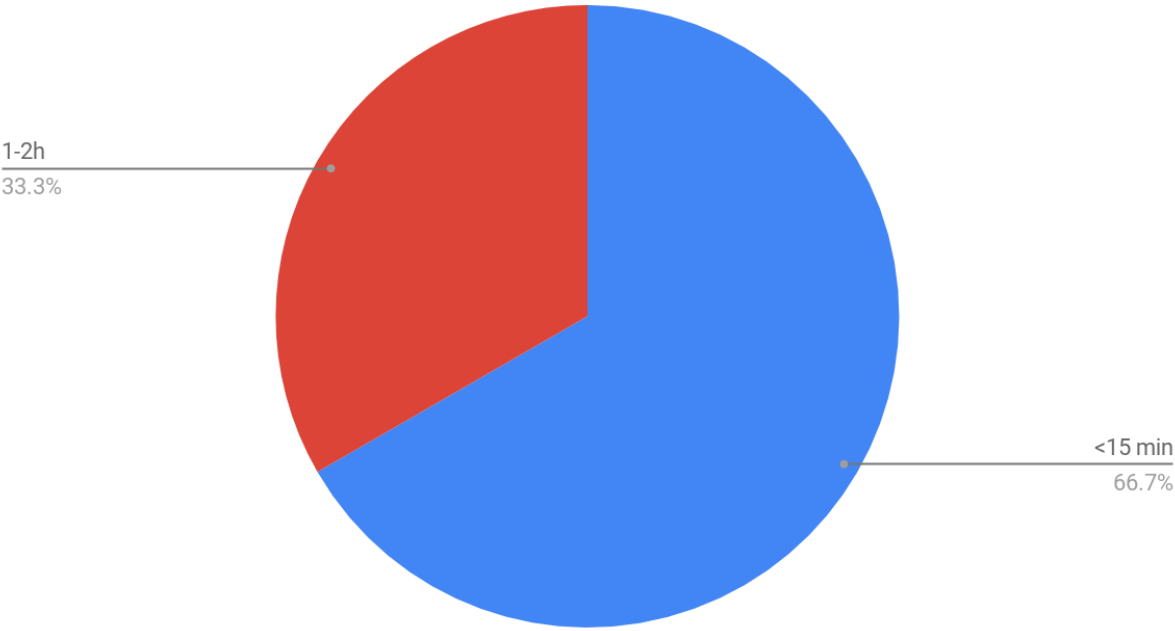
Working sectors



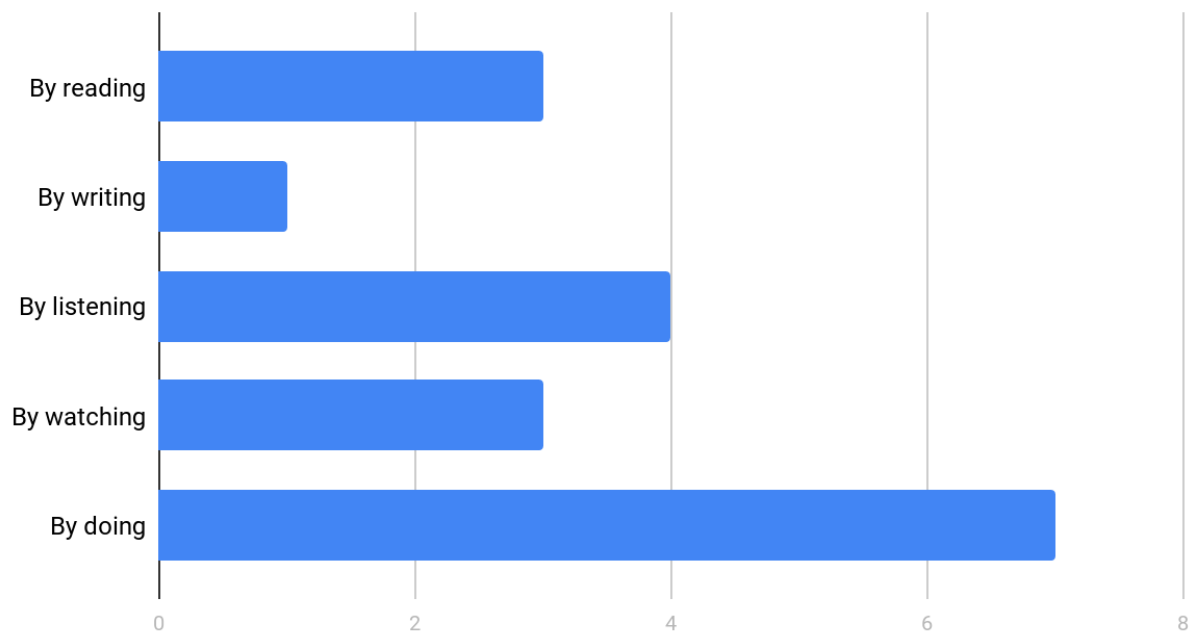
Dementia types dealt with



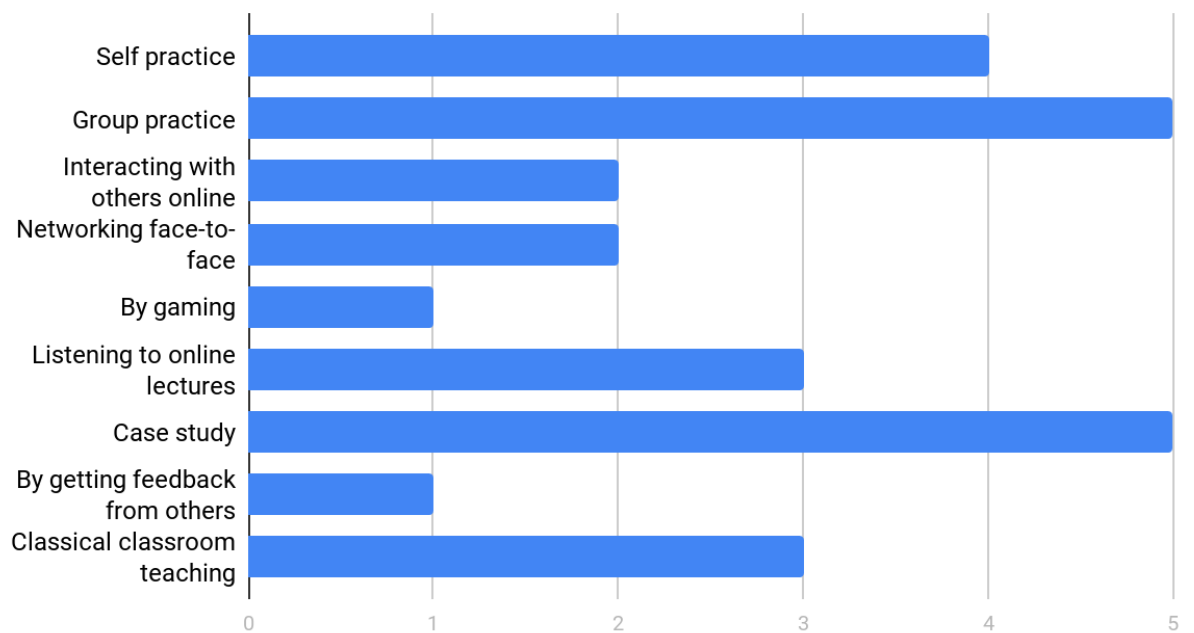
Time spent learning a day



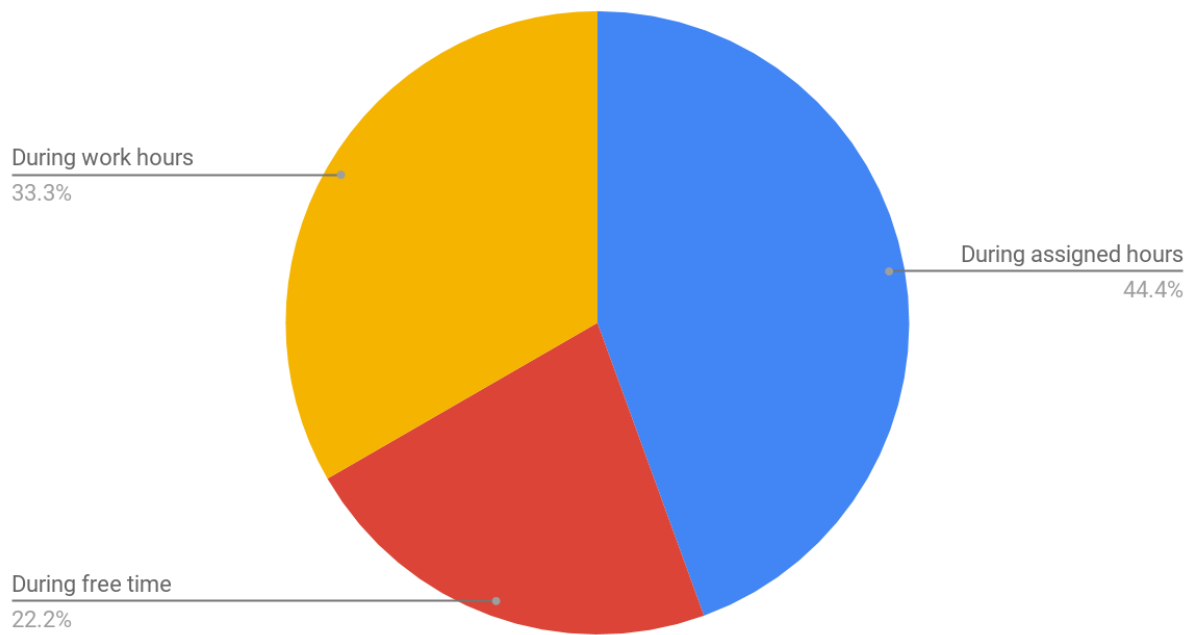
Best learning practices



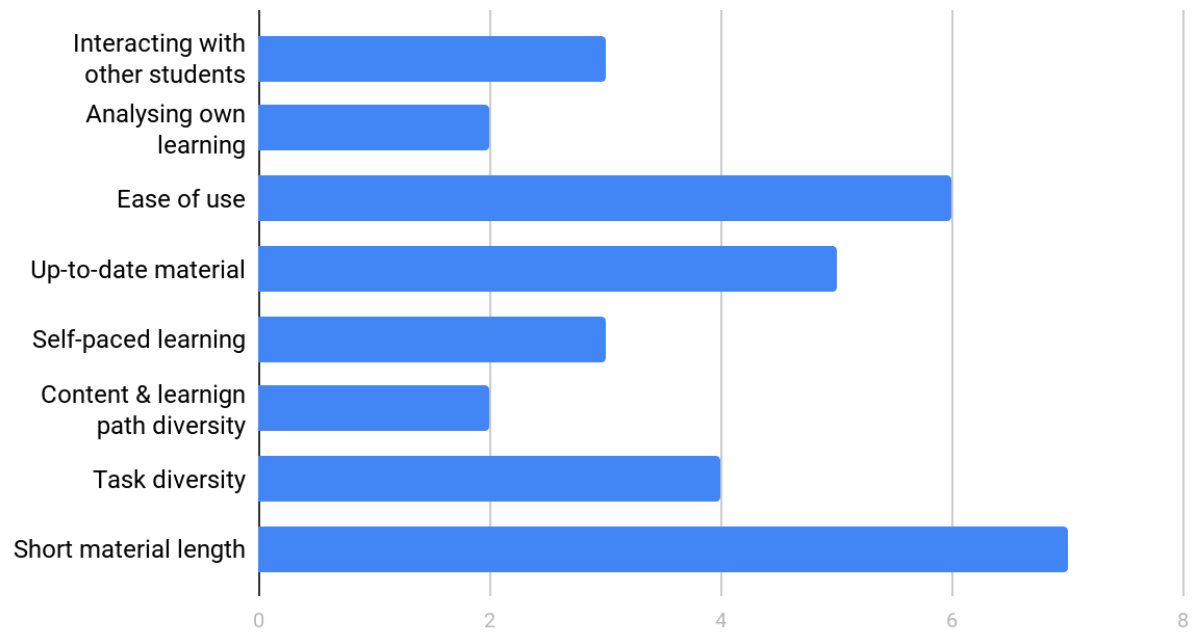
Best online learning practices



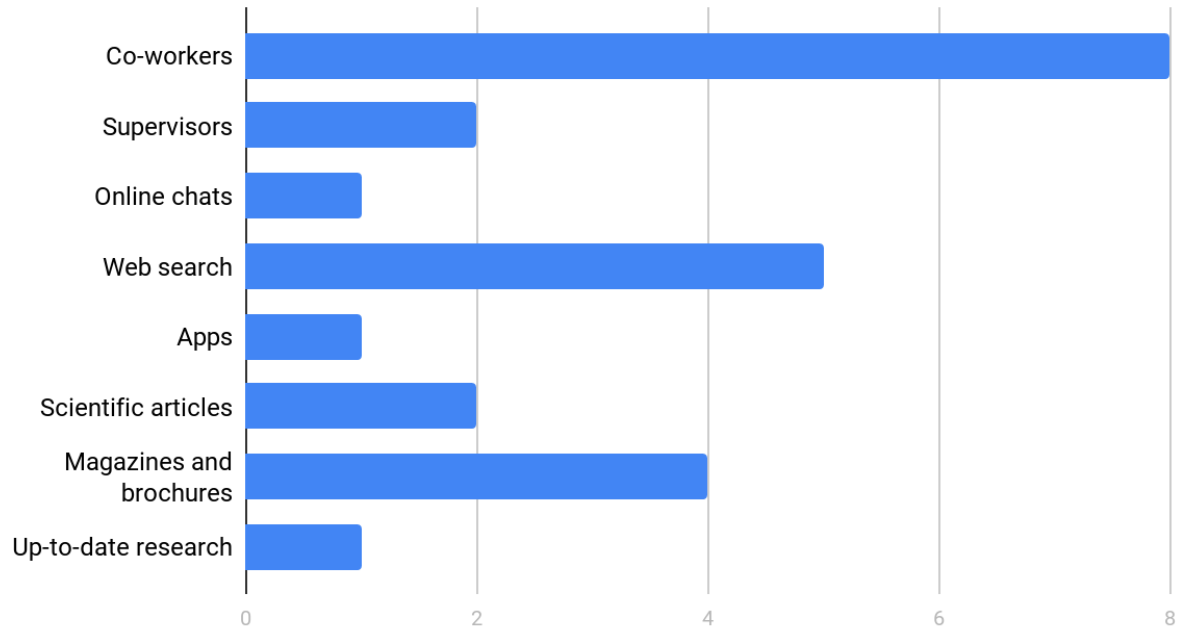
Study time preference



Important thing in e-learning



Main channels where CGs get knowledge necessary for work



Appendix 9. User survey analysis

Survey on learning

The user survey into Learning received 40 replies, and asked 87 questions. Below are listed five age groups, and their most frequent answers; resulting in the ‘average person’ of each age group. Afterwards, there follows a list of key observations from all the Learning survey results.

Averages person		18-24	25-34	34-44	45-54	54-65
Personal	Gender	Female	Male	Female	Female	Female
	Use of digital media	Expert	Expert	Expert	Expert	Developing
	Traffic (minutes/day)	30-60	<30	60-120	<30	0-60
	Common traits	Self-studier, Smartphone near at all times, Enjoys deep learning, Explores new apps & services, No sensory disabilities	No sensory disabilities, Smartphone near at all times, Self-studier, Explores new apps & services	Enjoys deep learning, Physical instructor wanted, No sensory disabilities, Smartphone near at all times,	Certificate of completion wanted, No sensory disabilities	Physical instructor wanted, Enjoys deep learning, Organizes time easily, Talking with other students wanted.
Learning	Self-development (minutes/day)	180+	120-180	30-120	<30	<30
	Preferred learning styles	Reading, Visual display, Self study	Repetition, Visual display, Audio-visual display	Reading, Visual display, Repetition	Reading, Audio-visual display	Reading
	Preferred class formats	Traditional	Traditional	Hybrid	Hybrid	None
E-learning	Frequency of use	Random	Monthly	Monthly	Yearly	Yearly
	Time spent (minutes/day)	30-60	15-30	15-60	0-30	15-60
	Perceived advantage	Flexibility in time, Variety of content, Low cost	Flexibility in time, Self-established pace	Flexibility in time, Self-established pace	Instant feedback, Flexibility in time, Self-established pace	Random

	Important aspects	Quality of content, Use of multimedia	Quality of content, Use of multimedia, Relevancy	Quality of content, Service design, Visual design	Quality of content	Quality of content
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Key observations:

- Majority are female.
- Women care more about the look of the service.
- Women want guidance, whilst men want a challenge.
- Women to a certificate of completion.
- Men spend less time in traffic.
- Men spend more time learning.
- Men are experts in modern technologies.
- Men to not want real-time lectures.
- Russians care less about the look of a service.
- Mixed (blended) learning is best for all genders and ages.
- Learning styles are personal, regardless of gender and age.
- No one prefers online lectures.
- Only experts at digital media enjoy being challenged.
- Those who use e-learning daily, prefer a non-traditional classroom format.
- Those who use e-learning more, prefer online discussions more.
- More time spent in traffic, means a stronger preference for self-studying.
- More time spent in traffic, means less time towards self-improvement.
- More time spent self-developing, means more engagement in e-learning.
- More time spent self-developing, means a higher need for challenge.
- Less time spent learning, means a stronger preference for easier ways to learn.
- Less time spent self-developing, means less time using e-learning.
- Time spent self-developing, does not influence reasons for using e-learning, or interest in online interactions and the look of a service.
- Reading, visual display, self-study, and repetition work best for all genders and ages.
- Flexibility in time is the biggest e-learning advantage.
- E-learning is a tool for engagement, self-improvement, and communication.

FCG survey

The survey into FCG (professional caregivers) received 17 replies, and asked 35 questions. Below are listed four age groups, and their most frequent answers; resulting in the 'average person' of each age group. Afterwards, there follows a list of key observations from all the FCG survey results.

Average person		35-44	45-54	55-64	65+
Personal	Gender	Female	Female	Female	Male
Learning	Self-development (minutes/day)	<30	<30	<30	60+
	Need to learn	Often	Often	Always	Always
	Learning channels	Random	Online search, Online community, Scientific papers	Online search, Online community	Random

Care-giving	Biggest challenge	Changes in PWD	Mood swings of PWD, Lack of understanding in the community	Engaging the PWD, Understanding the PWD, Lack of patience, Loneliness and need of respite	Paperwork, Workload
	Needs from the product	Long-term care instructions	Quick answers to situations, Info-graphic about dementia	Consultancy contacts	Checklists, Easy of paperwork

Key observations:

- All have daily interaction with PWD.
- All have moderate understanding of dementia.
- Men spend more time learning.
- Older FCG want more help and support.
- All want a better understanding of dementia and interaction with PWD.
- Call lines & magazines/brochures are the worst way of presenting information.

PCG survey

The survey into PCG (professional caregivers) received 24 replies, and asked 54 questions. Below are listed three age groups, and their most frequent answers; resulting in the ‘average person’ of each age group. Afterwards, there follows a list of key observations from all the PCG survey results.

Average person		25-44	45-54	55+
Personal	Gender	Female	Female	Female
	Profession	Practical nurse	Nurse	Nurse
	Sector	Public	Private	Public
	Self-development (minutes/day)	<15	0-120	<15
Learning	Learns during	Work hours	Work hours	Free time
	Knowledge channels	Co-workers, Web search	Random	Co-workers, Brochures
E-learning	Practices	Group learning Case study	Self practice	Random
	Important aspects	Short length of material, Up-to-date material, Ease of use	Short length of material, Diversity of tasks	Ease of use, Interacting with others
Care-giving	Biggest challenge	Memory loss, hygiene maintenance, and aggression of PWD	Non-acceptance of PWD	Aggression and inadequacy of PWD

Key observations:

- All prefer learning by doing, and least preferred are writing and watching.
- Least used knowledge channels are online discussions and scientific articles.
- Least important aspects of e-learning are the content, learning path, and analyses of own learning.

Appendix 10. Interview with Professional dementia caregivers

Acquired from Care Homes: Kontukoti and Villa Tapiola. Originally in Finnish, summarised by Soile Torronen (Memocate).

- 1) Anything that sounds like an issue to the nurses (time, stress..etc):
 - a) the care situations itself (for example how to respond to the patient when he/she acts confusingly, e.g. asks for his/her dead mother; the situations where they have to wash up the patient)
 - b) The work in care home is inspiring but also challenging
 - c) A lot of patients (Kontukoti) and not enough time. Don't want to rush but can't really say that "Can you wait for a moment", that won't help either
 - d) Hurrying up brings anxiety to the patients
 - e) Success with the challenging patients brings joy to work
 - f) knowing the patients background is important (Villa Tapiola). They know the patients background very well.
 - g) Aggressive patients, communicating problems are a challenges to the nurses
 - h) The support from the working community is important and useful
 - i) The nurses think education is a important part to keep up with the new knowledge
 - j) Studying on their personal time is possible but not preferred as they have other things to do on their free time.

- 2) Time they get per day to do anything but nursing
 - a) The nurses study on their own time (not during the workday in Villa Tapiola). Some of them think it would be unpleasant to work during the workday if a specific time is not given to that. They would get stressed thinking that they won't get their normal work done because of the studying. -> the manager of the Care Home should give a specific time during the work day for their studying.

- 3) Any specific needs (e.g if they seem to lack a certain information or skills in their daily work life)
 - a) Nurses want to learn more of the patients background (Kontukoti)
 - b) Knowledge for the patients carer at home: how the patient and his/her personalities changes as the illness advances
 - c) Knowledge of the different ways to respond to the patient's behavior
 - d) Ergonomics at work, and also patients ergonomics

- 4) Anything else that could be important when designing for learning
 - a) Learning online is thought to be a good way to learn. You can do it when and where you want.
 - b) Some of the nurses are not very familiar with learning online. They are little bit afraid of the computer itself. They need a good guidance/instructions for the learning platform.
 - c) They would like to have feedback as they work on the learning platform
 - d) Different types of learning types (audio/visual/etc) should be considered when designing the platform.
 - e) Short learning sections on the platform are preferred (they told us for example 5-10 minutes learning sections in Skhole training that they had been studying)
 - f) Navigation on the learning platform should be simple, very simple.
 - g) Nurses are interested to work with their own work community on the learning platform but are also interested to exchange experiences with other work communities.