

NORTH KARELIA UNIVERSITY OF APPLIED SCIENCES
Degree Programme in Design

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**DESIGNING AND DEVELOPING NORTH KARELIA
UNIVERSITY OF APPLIED SCIENCE'S VIRTUAL
SERVICES BASED ON USER RESEARCH AND
TESTING**

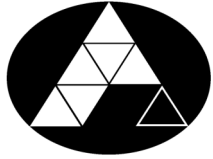
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- Appendix 1 List of abbreviations used
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<p data-bbox="252 904 376 931">Abstract</p> <p data-bbox="252 976 1406 1189">This thesis was about designing and developing an improved solution for the numerous virtual services NKUAS employs, such as email, schedules, and course material. These services were assorted programs, applications, and systems, which some users had problems using and managing. This decreases the efficiency, productivity, and ease of working or studying. Potential users include students, instructors, and staff members.</p> <p data-bbox="252 1234 1406 1447">In order to improve these working/studying activities, a better service product needed to be designed and developed. The aim of this thesis was a demo version of that service product. A user-centered method was used because the goal was to satisfy users' supposed needs through user research and testing to design a suitable service product. Questionnaires, interviews, shadowing, and diaries were utilized to gather information.</p> <p data-bbox="252 1491 1406 1850">The possible solutions that could integrate the numerous services, in addition to fulfilling the diverse requirements, elements, and characteristics, for the various user groups were researched. It was decided to design a virtual workspace portal that could be personalized and customized by the users. An open source portal platform called Liferay was selected as the optimal solution choice. Services and tools would be integrated in the form of portlets that users added and organized according to their preferences. This required background research about service, user interface, usability, and user experience design. Merging this knowledge with the user research and testing produced a successful demo virtual workspace portal that will continue to be developed.</p>	
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1 INTRODUCTION

This thesis is about designing and developing the virtual services provided by the North Karelia University of Applied Sciences (NKUAS) for its various user groups with user research and testing. At the beginning of the 2010 academic year (September 1, 2010), NKUAS launched their first attempt at an information portal, called Pakki. The end result of this thesis was a demo version of the Pakki portal combining a virtual environment for learning (VLE), a personal learning environment (PLE), and an enterprise information portal (EIP) utilizing Liferay technology that is geared toward all user groups and provides tools to assist with their work/study needs.

Pakki was geared toward students enrolled in the various degree programs at NKUAS and was built with Moodle. Although creating Pakki showed genuine care and thought for students' needs and the constant necessity of development, the development process should not stop evolving. Since it was mainly developed for students, the Pakki service product excluded a number of other user groups that are also vital, such as teachers, administrators, support staff, school affiliates, and other personnel. It also seemed to fail to successfully satisfy the needs of some of the target groups. Essentially, it was a simple website with links to other web pages with information when it could have been immensely more useful.

Design is no longer simply about creating a product like the most comfortable chair; it has expanded and transformed. With emerging trends and themes focusing on service design, usability, personalization, and virtual technology, the time was ideal to take advantage of all the advances and exploit the progression and research, trying to provide a key competitive edge and satisfy users' needs. Enhancing Pakki aimed to aid the user groups by improving the ease, productivity, and efficiency of

work, teaching, studying, communication, and the bond with and feeling of support from NKUAS. Although traditional service design focuses on the user journey and everything that is a factor in that journey, this thesis will think of service design from the point of system design.

The project was realized in a team of professionals as depicted in Figure 1. As a representative of Communicon Oy, I collaborated with two companies located in Joensuu that I had worked with on previous projects. Arcusys Oy, an information and computing technology (ICT) firm specializing in open source platform architecture, and Adepte Oy, a leader in the e-learning product and training sector, were interested to develop and design an improved service product (Pakki) in the form of a virtual workspace portal. Liferay, an open source portal platform solution, was selected as the optimal platform because it is dynamic, integratable, personalizable, reliable, secure, user-friendly, and widely accessible across operating system platforms. Both companies have experience with Liferay although I did not. I worked in a team with members mostly from Adepte Oy, such as graphic designers and programmers.

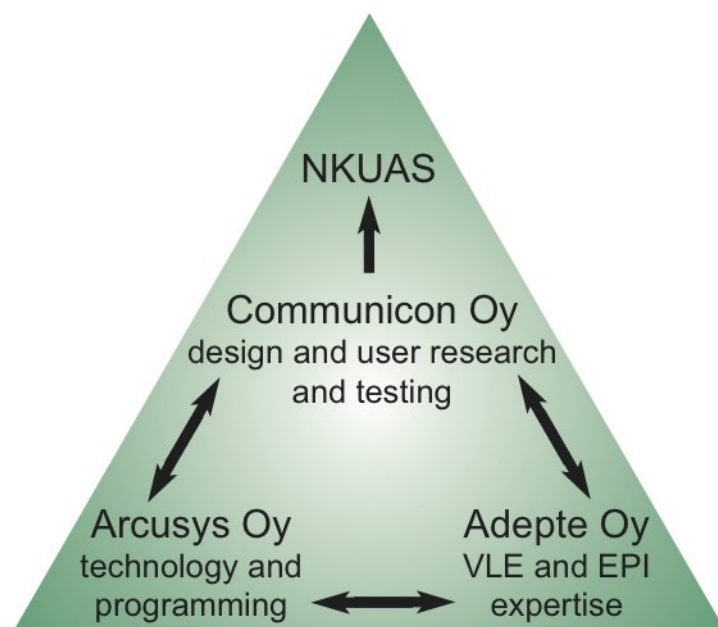


Figure 1. Displays how the various players involved in the project interacted and their roles.

Designing Pakki included taking numerous subjects and factors into account that I investigated through research of background information on subjects concerning the aforementioned themes as well as user research about users' needs and difficulties through questionnaires interviews, shadowing, and diaries. The information gathered from the research was incorporated into the design process at five developmental stages, one before starting the design process, one after the first round of questionnaires, one after the first round of interviews, one after the round of combined questionnaires and interviews, one after the round of user shadowing, and the final round after the user diaries had been collected. All of the new user information will be incorporated into each round of the development process. This will result in a demo version of the Pakki portal to try to provide what users seem to need and desire.

After the demo version is complete, the project will hopefully continue through my own design company, Communicon Oy, in collaboration with the aforementioned companies, Arcusys Oy and Adepte Oy, for NKUAS. Since the end result of this thesis will be the demo version and it will hopefully continue afterwards, some of the research and information will be used more at later points in the process when we have more resources and possibilities.

This thesis project will focus on developing a service product that effectively satisfies a wide variety of user groups' needs from a design (both user-centered and future-centered) perspective. Although this service product is based on technical portal software and knowledge of the software was necessary, this thesis will not focus on the technical architecture in any significant way.

2 BACKGROUND INFORMATION

2.1 Current options and their problems

Technology and products are constantly adapting and changing in order to keep pace with new breakthroughs, current lifestyles and trends, evolving needs and desires, and competitive forces. Compared to a majority of other industries, i.e. the furniture industry, the technological service product industry has rapidly and constantly evolves simply due to its nature. This is especially true for Internet-based service products and means that there are numerous products already on the market, as well as many possibilities for the products to be developed in the future. For the purpose of this thesis, the research will focus on combining enterprise information portals (EIP) and virtual environments for learning (virtual learning environments, VLE) and personal learning environments (PLE) in order to create the best possible portal service. (Each solution makes up for the elements usually missing in the others, such as the personalizable, communicative, and integrative functionalities although a PLE is a concept compared to set of commercial products like EIPs and VLEs.)

Most enterprise information portals (EIP) are Java EE (Java Platform, Enterprise Edition)-based, a platform written in the Java programming language, while some form of database, such as MySQL or Oracle, backs nearly all. EIPs strive to provide a single entry point to which information and services can be accessed through a web-based interface, a portal. Other programs, systems, applications, etc. are easily integrated in addition to the user being able to personalize their interface and required information using portlets, customizable and manageable components. Some of the better-known vendors and products are IBM (WebSphere Portal), Liferay (Liferay Portal), Microsoft (Office Sharepoint Server), Oracle (Oracle WebCenter Suite, Portal, Interaction, IAS Portal), and

Jasig (uPortal). However, many of these products are proprietary software, computer software whose license must be purchased from the copyright holder, and can be quite expensive. This lack of availability and freedom can result in obstacles when trying to integrate with other proprietary software.

VLEs have been used since computers were introduced into classrooms and e-learning was added to many curriculums and programs, in one form or another, although it has changed dramatically since its emergence. Using VLEs has skyrocketed in the past twenty years for a variety of reasons, especially with the expansive existence of the Internet allowing students and teachers to interact remotely and flexibly requiring some form of learning management system (LMS) and learning content management system (LCMS). More than ten years ago in 2001, over 70% of all U.S. universities and colleges were offering courses for distance learners, and VLEs were the integral element making that possible. Nowadays, it is almost unheard of to have a course without some virtual support because technology has “moved from being a support tool to an integral part of education.” (Annetta, et al. 2010; Serdiukov 2001) According to Ryann K. Ellis (2009), a solid LMS should: centralize and automate administration, use self-service and self-guided services, assemble and deliver learning content rapidly, consolidate training initiatives on a scalable web-based platform, support portability and standards, and personalize content and enable knowledge reuse. (Ellis 2009)

Liferay's Liferay Portal was selected as the optimal platform solution because it is dynamic, integratable, personalizable, reliable, secure, user friendly, and widely accessible across operating system platforms, as well as its cost efficiency since it is open source technology. The North Karelia University of Applied Sciences already has the required hardware to support Liferay technology and technological knowledge, significantly reducing the concrete expenses. Liferay is also ideal because it is equipped with functions and tools for VLEs as well as inherently being

personalizable (obviously essential for a PLE). It also allows for the rampant and significant social component important in many of our lives.

NKUAS currently employs Moodle (Modular Object-Orientated Dynamic Learning Environment), as its VLE. Moodle, written in PHP, has numerous standard e-learning components and elements, but the benefits are a bit limited considering all of the possibilities which means that either NKUAS should switch to another VLE, a very unlikely scenario considering the present economic situation, or supplement their current VLE with another system. By supplementing Moodle's VLE with the Liferay EIP, all of the user groups and user needs will be covered and a better, more effective service product will be created; the tools and functionality that Moodle lacks can be provided by Liferay. Since the two integrate quite well, using both is the best option now although the future hope is to completely replace Moodle with Liferay. Moodle is essentially outdated, static, limited, rigid, and not intuitive or very personalizable. The opposite is true for Liferay, plus more benefits, which is why the goal is to replace Moodle. This possible future replacement means that we must plan the product with the integration and future replacement in mind as well as consider how Moodle is already used because it is familiar to both students and staff members.

2.2 Design framework

The field of service design is extraordinarily expansive. Unlike physical products, service products are all around us, often without us even realizing it. Well-designed services should meld into our lives effortlessly; it is almost positive if the service is underappreciated and taken for granted, although there is the argument that this causes "passivization," an issue that will be discussed more in Chapter 3. Service product design tries to create the best possible customer experience, similar to traditional physical product design. However, service product design must also take

other factors, and some factors more strongly, into account, such as the service's providers and their personnel, more in-depth user testing, a huge variety of users, and more of sequence of events that culminate in a user experience. Users do not always choose the specific service product based on personal taste as compared to traditional physical products. According to Larry L. Constantine, a larger focus should be put on designing for user performance and not simply user experience because users do not always comprehend the connected framework, industry trends, situation paradigms, or the truly innovative and courageous solutions. (Constantine 2004)

Since the service product I designed for this thesis is strongly based on technology compared to a physical user experience, such as a holiday trip, technological factors need to be considered even if I do not fully understand the actual technology, mainly Java EE and PHP, since that is not my role in the project. When designing this service product, I needed to examine and incorporate various themes like virtual design, interface design, usability, educational use and benefit, and personalization. Although these themes are prevalent in various areas of design as well as other sectors and industries, these are the themes that were taken into account when designing the Pakki service product portal.

I also decided to approach the design of this service from a system design perspective with a mixture of two methodologies, joint application design (JAD), done in stages with a team of professionals, and rapid application development (RAD), prototype creation and user feedback sessions until users are satisfied. By applying these traditional methods of system design to traditional methods of service design, I came up with a method and process that suited our project's parameters and requirements. For example, it was impossible to research over 4,000 customer journeys commonly demanded by conventional service design. Figure 2 shows how these themes converged in the darkest central circle to create the foundation of design knowledge. Each of these themes in regards to they relate to a user's experience, and therefore satisfaction,

were needed and used to solve the problem of designing a better virtual workspace portal.

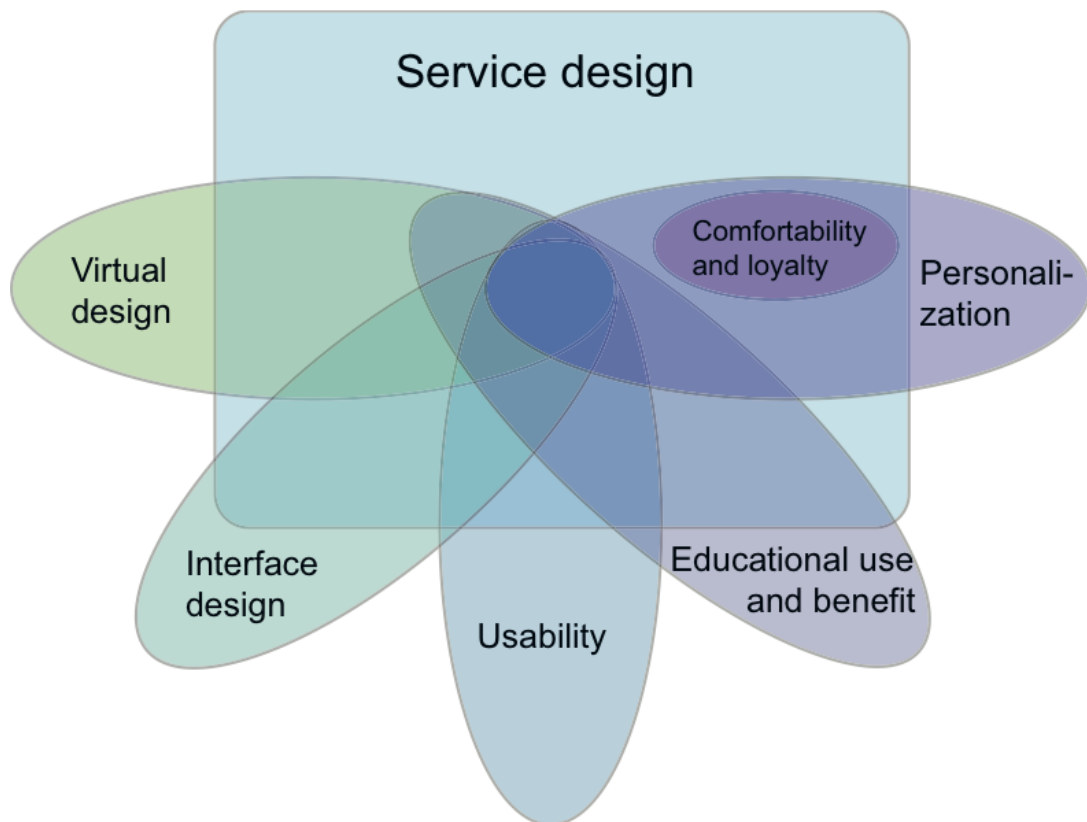


Figure 2. Design theme framework shows how the important themes converge to create the design theory background and how they relate to a user's experience.

2.3 Process and plan overview

After the completion of the demo product, I will continue as a member of the development team if the project continues. My main activity as a designer was a circular cycle of acquiring information, conducting user research and testing, analyzing those results, and figuring out how to implement it to design a satisfying service product as seen below in Figure 3. Each stage of the design process included all steps of the cycle. I also acted as project manager for the team, mainly since it was

important to approach the project from a user-centered perspective compared to a technological perspective.

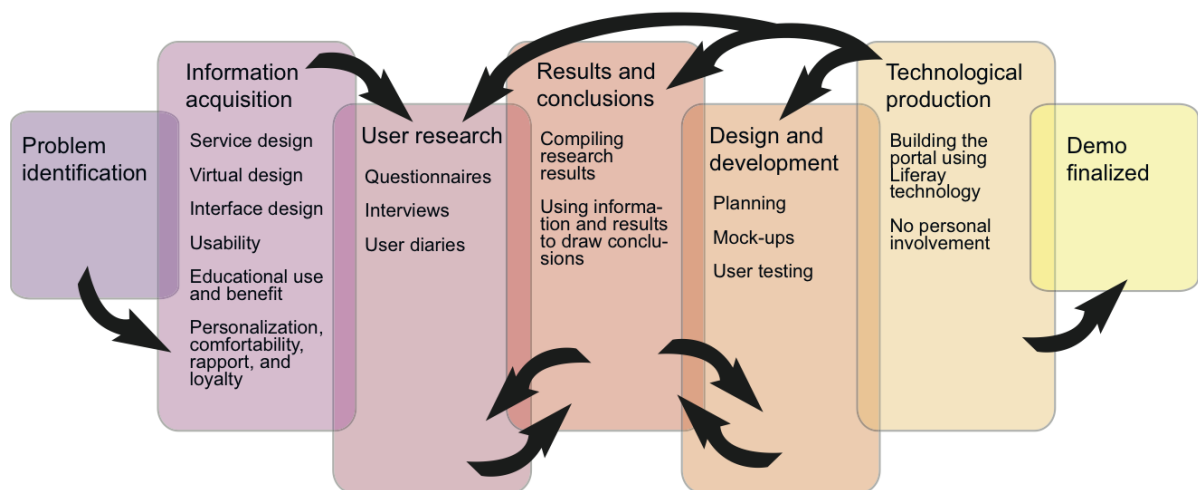


Figure 3. Design process and action plan shows the steps we will take to develop Pakki.

First, I **identified the problem** when Pakki was launched at the beginning of the 2010 academic year (September 1, 2010). It was a good first attempt, but it did not seem to satisfy all of the user groups or user needs, something I discovered when discussing with people involved with the NKUAS, like students and staff members. I saw the possibility of its potential and set out to refine and improve it. The first step was contacting two local companies, Arcusys Oy and Adepte Oy, to gauge their interest; both were excited by the project and agreed to support it. Actually acquiring the support of North Karelia University of Applied Sciences was more of a challenge due to traditional thinking, bureaucratic procedures, resources, and past experiences with demo products.

However, Mr. Jari Järvelä, Founder and Managing Director of Adepte Oy, is well-known in the e-learning environment sector and knew some of the key players already. The members of the team involved in the design and development and their roles were shown in Figure 1 in Chapter 1. By working together, we were able to convince NKUAS representatives of the benefit of and need for improved virtual services in the form of a

combined virtual environment for learning (VLE), personal learning environment (PLE), and enterprise information portal (EIP) culminating in a new virtual workspace portal.

Convincing the representatives and creating an action plan required preparatory background research already in order to be knowledgeable enough to present the idea to them. It was important to analyze from our perspective prior to extensive user research if there was even a need for this project, such as what was currently wrong with Pakki in addition to the possibilities and reasons for improvement. After we captured the representative's interest, I knew more about what **information and subjects** I should research, what I wanted to obtain from that research, and how that information would tie into the process and plan of the project.

User research and testing was the main part of the design process because it was where we not only found out the current issues with Pakki like what is missing and what users want, but it was what we continued with throughout the entire design process to ensure that the progress stayed on track with the true objective – to satisfy user needs. If we lost sight of what users needed, the entire project was done in vain. Since the user research and testing was done in many stages and throughout the entire process, I used a few different research methods depending upon which was most suitable for that stage in the process based on factors such as different objectives, requirements, and group sizes. As Morelli (2006) suggests, I used questionnaires to identify and define the current problems and objectives, interviews to gather deeper information about the requirements and get personal feedback, and shadowing/diary methods for longer-term information gathering where the user is in his/her own environment and true interaction can be assessed. (Morelli 2006) After each stage of research and testing, we **collected the information** and **drew conclusions** that we used to **develop the design** of the product.

The **first stage** of after some **background research** was to send out a questionnaire to all the students and staff members of NKUAS. Sending out the questionnaire to everyone meant that we had a better chance of receiving more results from a diverse sample of the population. A diverse sample should include the different user groups (students and instructors from different degree programs, administrators, people working on projects, and other staff members) as well as skill levels since both have assorted requirements regarding what needs to be developed for those users. Since we were combining a VLE, a PLE, and an EIP, we had to ask questions about their work/study and personal habits related to virtual services in addition to the normal demographical questions like age, user group, and computer usage. We were starting from the very beginning with a clean slate so we also wanted to ask open-ended questions that allowed people to tell us about their dream virtual workspace portal. Since we were utilizing open source technology, many options and possibilities were available to us. We did not want to inhibit or impact an individual's opinions.

NKUAS controls the research that can be done with its students or staff members so they had to approve of all the questions and methods. We made the questionnaire as a team since everyone wanted to know different information. To make it easier, we used NKUAS's Typala electronic questionnaire service to send it and gather the results. That information was the foundation for our development and allowed us to create a framework of areas we could improve.

Actively **analyzing the result and framework** allowed me to break it down to form a rough information architecture, how the information is displayed and used, and the desired user experience as well as choose the software we would use. This is where the real **design and development** began. It was a giant leap because I had to learn the chosen Liferay portal system, its imitations, possibilities, and available solutions, as well as figure out how to achieve and/or incorporate the main desired characteristics, user-friendly, dynamic,

customizable/personalizable, help communication, and educationally beneficial. There needed to be a synthesis of the **technical possibilities** and the raw user data I gathered with the questionnaire as well as the design research.

We used the information architecture to continue on to the **second stage** where I worked with Mr. Ilkka Kosunen, a graphic designer working at Adepto Oy, to **generate a series of “flat” mock-ups**, photos of layouts not done in Liferay, and then **asked some users for feedback**. Again we **analyzed that information** and went **back to the drawing board to implement it into the design**.

The **third stage** was when the design truly started to take form because we had the background information about what was currently wrong, what tools users wanted, and how they felt about the layout. We also had the first draft of the demo portal up and running so it made making changes much easier. I again went to **talk to users**, this time with screenshots of how it looked with the features in the form of portlets and visuals they said they wanted as well as more questionnaires. This was an important step because this is where we took the information about what they wanted and the information about how they wanted it to look and put them together; **checking** to see if we merged them successfully was critical.

Since a key feature of the service product was its interactivity with users, the **fourth stage** was to go show the users how it works and how they can **interact** with it. We already had a rough demo of the portal up and running so we just **incorporated the feedback** from the third stage and then I went to different campuses to sit down with various users. They were able to see how the portal worked and could actually interact with it. I used a mixture of interviews and questionnaires to **gather information** concerning visuals, usability, need satisfaction, usefulness, communication and communal activity, and emotional support. This stage was the most useful because it provided **concrete issues to fix**.

After the issues that could be resolved were fixed, I made a few users their own accounts in order to let them test out the portal for a longer period of time. They kept a diary about their experience with it because I wanted to see how their **interaction evolved** with more use and what the users eventually do with it. We also wanted to know how it helped them with their work/studies, what technical issues arose when they got more comfortable with the system, and what was still missing that we could develop in the next stage of the project since the demo was now up and running.

3 DESIGN THEMES

3.1 Service design

Service design has been around for as long as people have been organizing activities and processes although it only became recognized as a separate field in the early 1990s at the Köln International School of Design. Previously, however, it was applied mostly in marketing and management activities and business strategies. (Sostack 1982; Morelli 2007) Service design has become increasingly important, advantageous, and prevalent in all sectors of commerce because each sector ultimately has customers that need to be satisfied, the fundamental target of good service design. It focused on analyzing and improving how the provider of a service interacted with customers as well as how material components, products, and immaterial components, services, interacted and supported each other. In one way or another, all products need a service counterpart and all services employ some type of physical product. Service design examined the customer journey, all aspects that went into how a service is provided. (Shostack 1982; Shostack 1984.)

During the past ten years, and especially the last five years, designing satisfying service products has boomed to impressive levels. For customers, a product is no longer only a simple product; consumers are also paying attention to the experience, as well as quality, of that product. The same goes for traditional services. Customers, of course, want something that serves their needs and knits into their own lives, what their journey is using that service. Some professionals, such as Morelli (2007, 2), suggest that this "...traditional market-driven approach is based on the idea of *relieving* people of the many tasks of everyday life" and ultimately "lead(s) to a progressive 'passivization' of customers" because "tasks... are now performed by something (a product) or someone else (a service)." In many ways I agree that our lives are inundated with tools to "help" us or make our lives "easier" when in fact these tools complicate

and weigh us down with so many options and possibilities to choose from in addition to “removing us” from reality. A well-designed service takes these issues into account and strives to not simply create a duplicate of another service, but forms a more systematic solution that incorporates the user experience with the material and immaterial components to be successful and actually useful. I took the approach to service design and used it in the way a system would be designed with the theory of joint application design (JAD) where a group of experts, such as systems designers, graphic designers, system managers, and usability designers, work together in stages to develop the system and its implementation.

Technology and our manipulation of it has become the nucleus of that model. The flexibility between for what, where, when, why, and how an individual decides to use the material and immaterial components depends largely on the technology that is employed for the service. For example, is it suitable and user-friendly for computers or mobile devices? In the context of our virtual workspace portal service product, identifying those factors was key. We needed to pay attention to:

- What
 - the users wanted (tools, visuals, experience, etc.),
 - the technology could provide,
 - the corresponding material components were (computers, mobile devices).
- How:
 - various users interacted with the service product (and how that interaction will evolve based on increased skill, technological advances, etc.),
 - the users’ characteristics (skill level, user group, etc.) affected the needs, interaction, and experience.
- Why did all of these things happen.

By approaching the virtual workspace portal service product from a designer’s perspective compared to a technical perspective, I was able to

develop Pakki by focusing more on the user experience and how that would evolve in the future using user-centered and future-centered methods. All those aspects that users said they wanted ultimately were really just the desired user experience; providing that satisfying experience now, as well as in its future transformation, is what would either make the new Pakki a successful service or not. Researching characteristics of good services helped me to determine how the issues revealed by the user research and testing needed to be used in the design process in order for Pakki to be successful.

For instance, one major issue that arose was all the other services that supposedly “assisted” with work/study activities in fact impeded the efficiency simply by their quantity. A few of these services actually function, in the sense that they successfully fulfill their basic intentions if not satisfy users with good experiences, in a narrow scope, like the grading system, course schedules, etc., but don’t work together, almost like separate screws and wires and parts that are not put together to form a completed working product. Combining these separate wants, components, and systems into a good service requires thought about the user interface design, its usability, a user’s experience, and how it is educationally relevant in order for it to not only be *usable*, but also *useful*.

3.2 User interface design

User interface design is important in both product and service design since it helps both to be used and understood as intended and plays a huge part in both the usability and user experience. However, as most designers know, and Hassenzahl (2003, 3) points out, “there is no guarantee that user(s) will actually perceive and appreciate the product the way designers wanted it to be perceived and appreciated.” It is impossible to control how a user uses a product or service; we can just attempt to guide and influence them, and good user interface design assists with that correct guidance. As technology and fashion change,

both virtual and user interface design change along with them, but a pivotal matter will always be how the aesthetics and technical functions are balanced to achieve that correct guidance and experience.

How well this balance is achieved has actually been considered a lot in the past. It has been partly standardized by the International Organization for Standardization (ISO) in relation to the Human-Computer Interaction (HCI) community with the principles formed starting in the late 1970s by IFIP (International Federation for Information Processing). The same information is needed to create a user interface as a good service, but the user interface is the visual and organizational structure of the service product – what immaterial component, the virtual workspace portal, the user is physically presented with through the material component, a computer or mobile device.

The IFIP (International Federation for Information Processing) model shown in Figure 4 was valuable since it was essentially the basis for the original ISO standards. Although some believe that it is out of date (early 1980s), I disagree because the objective over time and between disciplines has always been the same – to satisfy users.

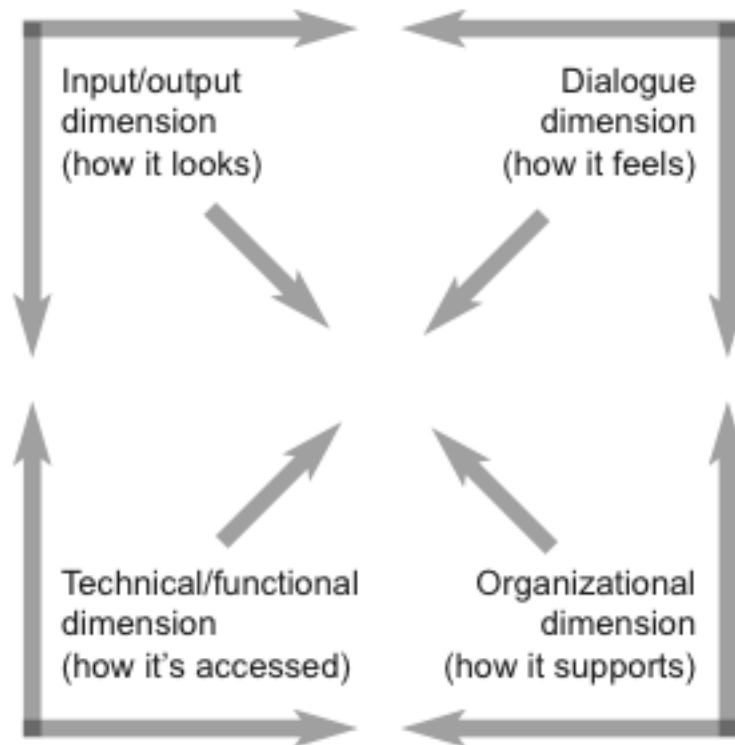


Figure 4. IFIP's model detailing the different themes and their interaction for interfaces, proposed by Dzida, required for usability.

Reinhard Opperman (2001, 1) states that, "user interface design is a central issue for the usability of a software product" and that, especially for learning management systems, "the changing character of learning requires a learning environment encompassing new interfaces between technical systems and learners." Opperman (2001, 1) also noted that, "learning will be more and more integrated into the work process and in daily life activities." Both elements were important for us to take into account when designing the service so that it was not another product in an already flooded market of learning, portal, interface, and assistance systems. We needed to create more value than just a virtual learning environment, and that meant researching and combining other activities of users.

There are many standards, and parts to standards, that the ISO has published, the salient one being ISO 9241. The different parts are depicted in Figure 5.

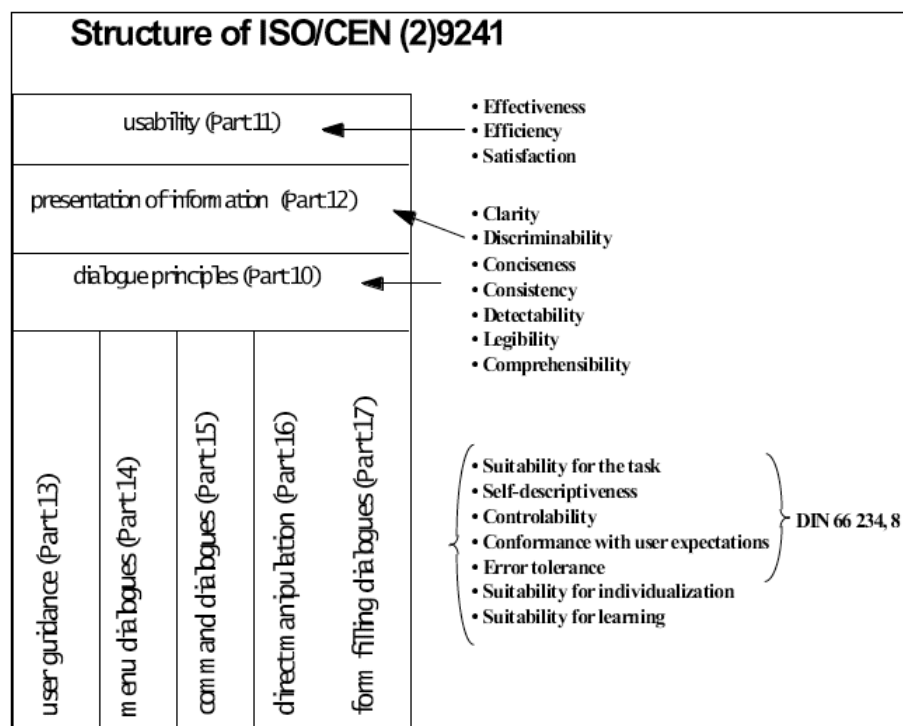


Figure 5. Structure of the Parts of the ISO 9241 (ISO 1996) standard depicted by Opperman. (Source: Opperman 2001)

The ISO 9241 (ISO 1996) ergonomics standard was informative and essential when I was creating the elements of the design process and plan, how to implement them, and the development of the service product. Part 10 defines the seven “dialogue requirements” resulting in the “feel” of the interface as:

- suitability for the task (does it support a user’s task accomplishment?);
- self-descriptiveness (how intuitive, easy to understand, or explainable is the service?);
- controllability (is a user able to control the interaction – use, speed, complexity, etc. – with the service?);
- conformance with user expectations (does the service meet user expectations in line with current practices?);

- error tolerance (are the objectives/expectations still achieved/satisfied easily by the user or what are the revert mechanisms?);
- suitability for individualization (is the user able to personalize/customize/modify the service to suit his/her own needs/requirements/desires?); and
- suitability for learning (can a user learn the service well and how easy is it to do so?).

(Source: ISO standard 92411996; Opperman 2001)

The “look” of the interface is then described in Part 12 of the ISO (ISO 1996) standard as the “information presentation,” i.e. how the information is organized. As with most elements that constitute a whole, the failure of one of these principles can result in failing to meet the user expectations, resulting in “bad” usability and user experiences. There are, again, seven attributes:

- clarity: the information content is conveyed quickly and accurately;
- discriminability: the displayed information can be distinguished accurately;
- conciseness: the user is not overloaded with extraneous information;
- consistency: a unique design, conformity with the user’s expectation;
- detectability: the user’s attention is directed towards information required;
- legibility: information is easy to read; and
- comprehensibility: the meaning is clearly understandable, unambiguous, interpretable, and recognizable.

(Source: ISO standard 9241 1996; Opperman 2001)

This is the basis of my information architecture that followed the principles of the usability, which will be discussed in the next part. I took all these principles into account when doing my user research and testing

to find out what were the issues with the current Pakki, what users seemed to want and need, and how to translate that data into the new service product. One issue that I noticed immediately, however, was that many of these principles conflicted, e.g. being concise while still allowing personalization. I also had to overcome the obstacle that we were trying to solve many problems (combining a VLE with an EIP to form a more useful service product) for many user groups, and the same answer is not always suitable for all aspects. This led into how to design a good service product so that it is *useable* and *useful* and suits the users perceived needs.

3.3 Usability

Usability is everywhere; it is essentially how humans interact and experience everything surrounding us. Creating something that is usable stems from understanding (or trying to understand because, as previously stated, it is impossible for a designer to control these factors and good design simple guides and instructs) who, what, where, when, why, and how something will be used. Usability is not the same thing as satisfaction, but it plays a large role in a product or service's ability to satisfy a user and can easily dissatisfy a user.

Usability is defined by Jakob Nielsen, similar to Part 11 of the ISO 9241 (ISO 1996) standard, as "a quality attribute that assesses how easy user interfaces are to use" regarding five quality components:

- learnability: how easy is it for users to accomplish basic tasks the first time they encounter the design?
- efficiency: once users have learned the design, how quickly can they perform tasks?
- memorability: when users return to the design after a period of not using it, how easy do they reestablish proficiency?

- errors: how many errors do users make, how severe are these errors, and how easily do they recover from the errors?
- satisfaction: how pleasant is it to use the design?

One attribute that is equally important is a design's utility, its functionality. Does it actually do what a user needs? It is important to note that sometimes users do not actually know what they need or want in addition to that need and want evolving, often extremely quickly. The initial need or want could have been correct at one point and then altered.

Basically, if users cannot use a service or product satisfyingly i.e. possibly due to bad usability, user interface, user experience, etc., then the service or product becomes just another waste of time and resources for all parties involved and does not fulfill its intended purpose. Usability, user interfaces, and user experiences are all linked and support each other. A bad user interface causes bad usability, which in turn causes a bad user experience.

To combat these issues, Gould and Lewis (1985, 300-311) suggest having an early focus on users and tasks, empirical measurement, and iterative design. My main focus in the team of professionals like Mr. Jari Järvelä was to be user-centered, but we needed to take future-centered methods strongly into account because services and products, especially ones of a technological nature, quickly and easily become outdated and unnecessary. As Constantine (2004, 4) humorously points out, "user-centered design in practice is largely trial-and-error design,... guessing followed by repeated corrections and adjustments guided by checking with users." This needed to be done consistently throughout the whole process and later throughout the product's lifecycle in order to maintain the usability and usefulness. The interesting phenomena of who purchases and uses products or services affects its value proposition, such as the customer segment, which varies throughout a product's lifecycle. When something is new and novel, a bit of an unknown entity, different types of people purchase and use it compared to when a product

is situated comfortably and an image is established. When a product or service matures, it loses its novelty and is then often taken for granted. This is the point when the usability and user experience becomes the crucial focus and advantage in order to keep users involved.

In addition, we must not be afraid of introducing new things despite the fact that users would prefer to use a product or service that is familiar to them even if the usability and design is worse. Liferay is dynamic and flexible, so it can easily be changed in the future according to users' needs and later developments. The virtual workspace portal is also *usable* and *useful* since it combines the elements needed for work/study productivity in addition to tools for a user's personal life. Since there is a large range of users and their requirements, we needed to make it both customizable and tiered to account for group needs and skill levels. Integration possibilities were the biggest usability issue because all user groups and skill levels mentioned that the current systems. Furthermore, applications are not collaboratively usable and need to be integrated. Each system or application may function adequately on its own, but when there are so many, the usability of each as a whole decreases significantly; users being so saturated with systems and applications that are not collaboratively usable is not efficient or productive. Considering how they were integrated and the aggregated usability of the service product meant taking into account how service design theories and virtual and interface design principles converged to actually be *useable* and *useful*.

3.4 User experience

An experience that a user gets from a service or product is essential to his/her satisfaction. This is especially true when there is a negative experience because one negative instance can totally ruin an otherwise positive experience. Negative instances are more memorable so they

tend to appear more important and prominent. Reducing the negative instances and increasing the positive experiences can assist in the total success of the product or service.

According to Norman (1999), a user experience comprises the total interaction with the product or service and how a user thinks, feels, uses, learns, and perceives a product. The ISO (ISO 1996) describes it as what someone perceives and how someone responds to that perception of the use or anticipated use of a product, system, or service. Since there are so many variables and factors that affect an individual's experience, that allows for tremendous flexibility but also the occurrence of faults. The variables that play a part in the user experience are individual and constantly changing, such as personal preference, trends, environment, situation, emotions, or sometimes something as simple as the weather. Also, as mentioned previously, a designer cannot control how a user uses or perceives a product or service. The difference between the designer and the users' perspectives are represented in Figure 6 below by Hassenzahl:

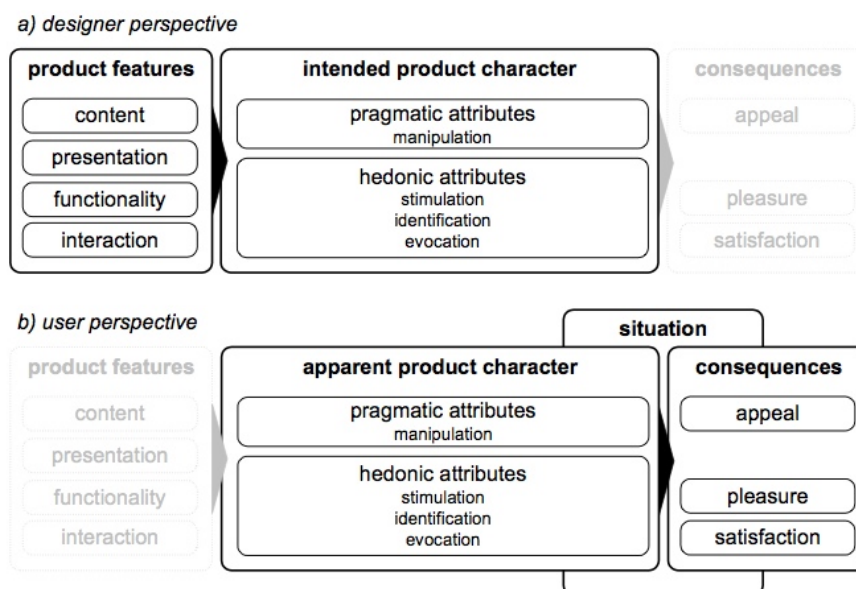


Figure 6. How designers' and users' perspectives differ in relation to user experience. (Source: Hassenzahl 2001, 2)

The features from the interface, i.e. content, presentation, functionality, and interaction, influence the usability of the product or service which in turn influences the user experience. Designers focus on the first part – how the features are realized while users focus on the consequences or results of those features. For a service product like the new Pakki, which is a virtual service with situational, environmental, and individual variables, those results and how designers can guide users towards the intended results is what the team I worked with needed to determine and integrate back in the interface and usability.

I had to ask myself what kind of experience we wanted our users to have and then work backwards to see how we can draw on the overlapping ideas of interface design and usability to further that goal. Of course, assessing the current situation was essential, but making some user scenarios based on the groups the user base helped to map out which characteristics would be beneficial for the separate user groups. I wanted to know what kind of users we were dealing with, how did they already use computers and the services they provide, especially for communication and education activities, what was the current level of usability, and what would improve it that level of usability.

4 USER RESEARCH AND TESTING: PART ONE

This part of the user research involved gathering background research about the current situation, what users currently thought they wanted and needed, and how users felt we were progressing considering their feedback. In Part One, there were three stages of research and testing that did not involve any personal interaction with the demo virtual workspace portal. Interaction between the users and the service was in Part Two of the user research and testing.

4.1.1 Stage one: user research questionnaire and results

All of the research I did about designing services, interfaces, usability, and user experiences connected at this stage because we had to decide what kind of information we wanted to gather, how to go about doing it, and how would we use that information to design the virtual workspace portal.

The first stage of user research needed to reach as many people in our population since the intended user base was over 4,000 individuals. In that population, there are students, instructors, administrators, developers, and other staff members. The easiest way was to make an online questionnaire and distribute it to the population we wanted to gather information from knowing that only a small percentage of people would respond. The questionnaire and the exact value results are located in Appendix 2.

Since NKUAS controls the research (permission granted and presented in Appendix 3) that can be done with its students and staff members, I collaborated with a representative from the Student Services Office and used NKUAS's own virtual feedback services, Typala, to distribute the

questionnaire and measure and analyze the results. Mr. Järvelä and I worked together to come up with the questionnaire since he has practical experience in making learning platforms and other portals, such as Moodle, for educational institutions, while I had been doing research on what is the interaction and relationship between interface design, usability, and user experiences, and how those designed together culminate in a successful service product. In addition to the basic demographic information, we focused on gathering information about which, how, and for what users used the various available virtual services for their work/study activities; what were some of the issues with the services, what those issues stemmed from, and how the user thought they could be solved; and what would be their dream virtual workspace portal.

We sent out the questionnaire in the spring of 2011 and received a total of 139 responses.

The first question we asked was about the individual's age. We wanted to see if what was the age distribution of individuals since sometimes that can be a factor in which user segment an individual belongs to and an individual's technical skills.

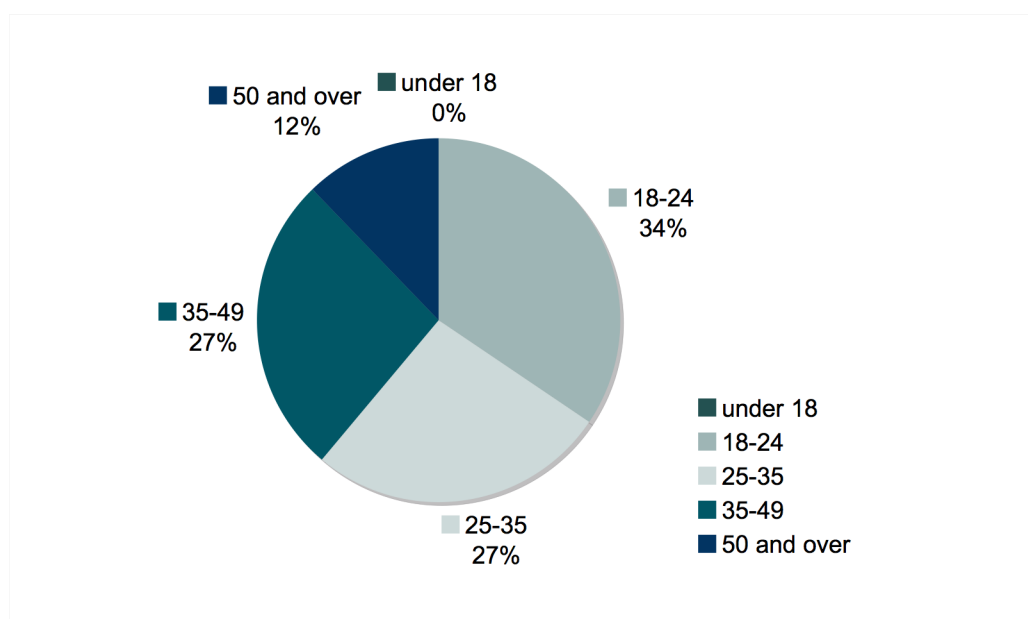


Figure 7. Question1: What is your age range?

Figure 8 below shows that from the sample of responders, about 75% were students while the remaining 25% worked for NKUAS. This meant I needed to focus mostly on students and their supposed needs and requirements, but also make sure the service product was appropriate for staff members and their requirements.

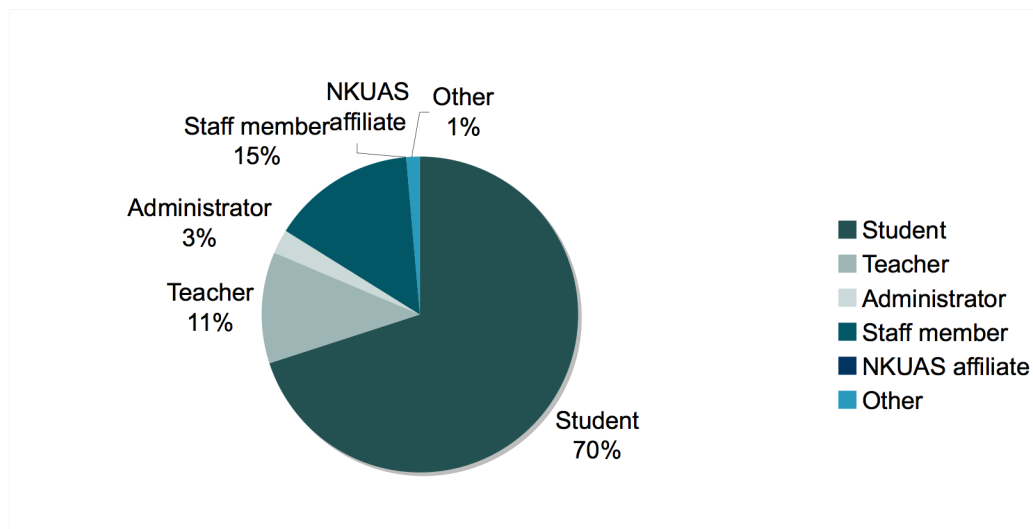


Figure 8. Question 2: Which user group do you fit in best? (Select all that apply.)

We wanted to know how many years the individual was involved with NKUAS because users with a longer history of using a service either tend to be more familiar with it and find it more usable or they are more familiar with it, are very frustrated and dissatisfied, and have opinions about how to improve it. It was important to consider the validity of our results. Some individuals that had used the current services longer many have had more of a loyalty to the current service in addition to individuals that have not used the services very long may not have had a chance to encounter as many issues. However, as seen in Figure 9, the results were relatively evenly distributed.

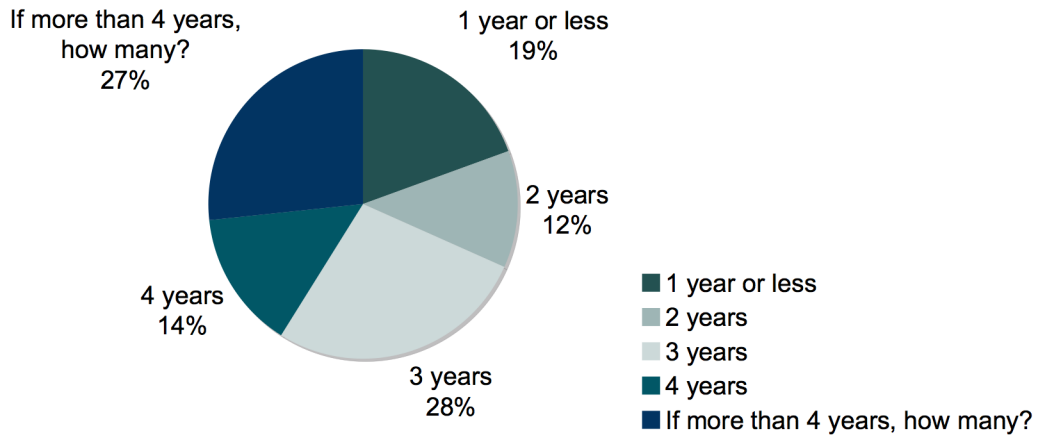


Figure 9. Question 3: How many years have you been involved with NKUAS?

Knowing how many hours an individual used a computer for his/her work/studies per day as depicted in Figure 10 convinced us how important of a tool a computer was to complete those activities, giving us reason to improve it. They seemed to use a computer for a majority of their “work” day, more than four hours out of an eight-hour work day, or for about two hours, still a significant amount, showing that it is a central component in a user’s work/study life. By designing a *useful* and *usable* virtual workspace portal, we could help the “heavy users” that are the majority to be more efficient and productive as well as possibly provide tools to make the “light users” supplement some of their activities and take advantage of NKUAS’s offered services.

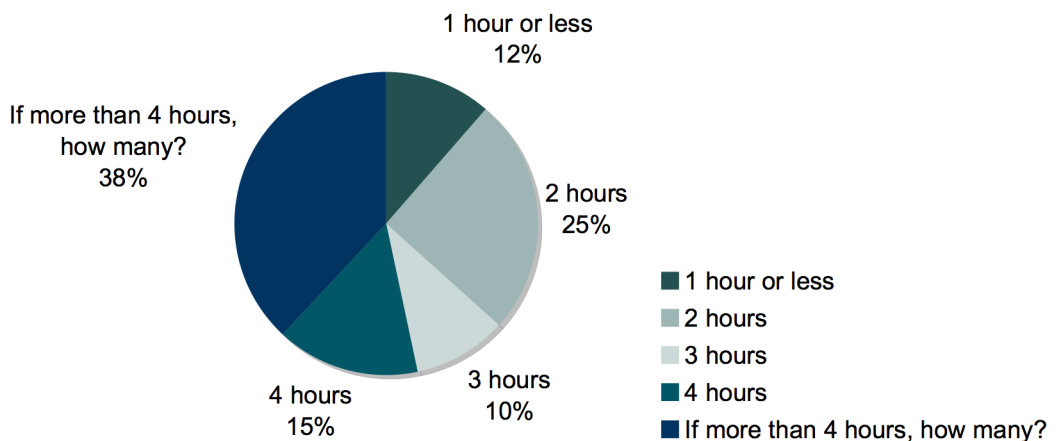


Figure 10. Question 4: How many hours a day do you use a computer for your work/studies?

We wanted to compare how long individuals used a computer for their personal life in correlation to their work/studying life. According to the results displayed in Figure 11 below, the amount that individuals use a computer for their personal life decreases consistently, showing that users do not particularly want to be on the computer so much when it is not necessary. We do not need to focus so strongly on the applications and services people would use in their personal lives at this point, but it should be an available option for the future.

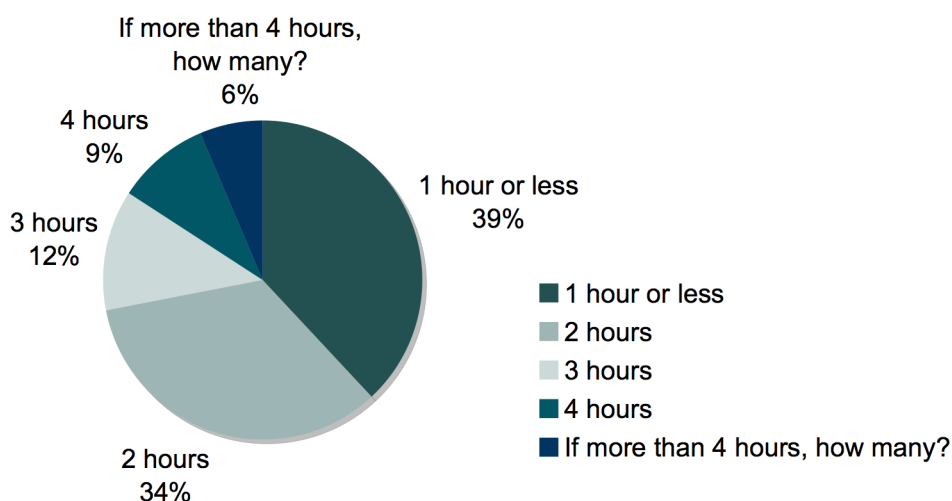


Figure 11. Question 5: How many hours a day do you use a computer for your personal life?

As mentioned previously, we needed to examine what the current technical skill levels of users were because if individuals reported a low skill level, than that could have meant that they simply didn't know how to use the current services, showing a usability problem and a bad user experience. If skill levels were high and individuals were not satisfied, that also meant a usability problem because even these users had issues.

A majority of the users have intermediate skill levels, 78.4% report a level of 3-4 according to Figure 12, so that means we are able to focus on a little higher level of operation. We can add options for customization and personalization easily. The high skill level was surprising but is a good sign for future development. Users can get more involved in the platform and develop it for their own uses as well as improve the communal aspects.

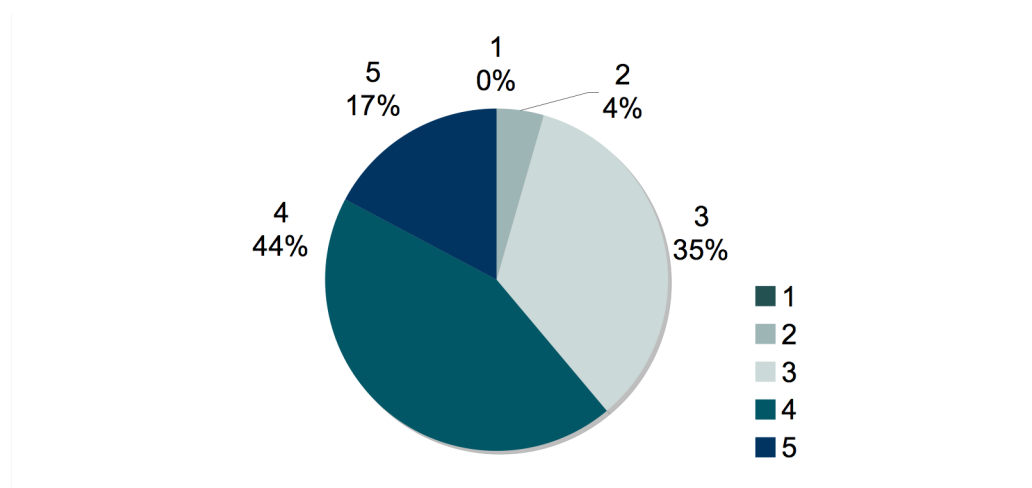


Figure 12. Question 6: How would you rate your technical skills? (1 is the lowest, 5 is the highest)

Users seemed to be mostly satisfied with the current situation of NKUAS's virtual services; this was somewhat unexpected considering my background research before even starting the thesis to see if this would be a viable and useful project. Furthermore, current satisfaction is not always a good indicator of required improvement due to factors such as constantly changing situations, users not always knowing what they want, not open to other alternatives due to familiarity, biases, and other aspects that can affect the seeming satisfaction with a product or service.

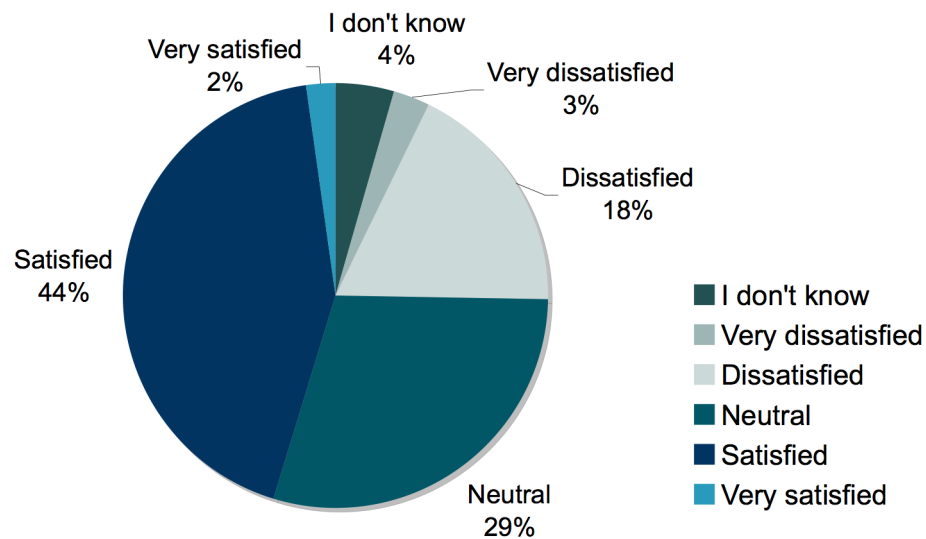


Figure 13. Question 7: How satisfied are you with the current NKUAS virtual services?

Taking the satisfaction level from the previous question into account, there were many reasons for the dissatisfaction and not so many reasons for the satisfaction. Of course, functionality is important, but is that true usability or simply familiarity? I needed to find that out with more user research and testing later on in the design process, but first I wanted to find out why or why not individuals were currently satisfied.

- + The new webpages are much better than the old web pages
- + A lot of information is available
- + Enough for my needs and I can find the links when I need them
- + Everything works the way it should
- Slow and many glitches
- Too many sign-ins (impractical just for schedules, so many “clicks”)
- Signed out after a short time
- Separate systems and programs do not work well together
- Structure of the website is complicated and hard to find the relevant information
- So many things I do not need
- Visual interface is confusing and not clear

- Does not work well with all operating systems
- New improvements are not really improvements, actually made it worse

Since users reported such a high amount of computer usage for their work/studies, I wanted to find out information about the specific activities users participate in. We needed to know this information displayed in Table 2 because there was a possibility to change how the services were organized, but we first needed to know which were the most important. We noticed that the communicating between users was key, as well as scheduling, but students did not have the possibility to really create their own schedule the way staff members did. For students, compared to other staff members, viewing class schedules was a significant issue. The other services were important at the moment that they were needed, but the frequency of use is low. However, frequency of use and how important an activity is are not always the same. Email is important and used often, health services are important and used periodically when necessary.

Table 1. Question 9: What are the top activities you use the computer for, both personally and for work/school?

Activity	Not important (%)	Somewhat important (%)	Important (%)	Very important (%)	Necessary (%)
Email	0.7	2.2	10.1	45.7	41.3
Schedules	22.2	14.8	17	25.2	20.7
Grades	19.3	17	20	25.9	17.8
Communicating	2.9	7.4	16.9	46.3	26.5
Library services	13.9	26.3	29.9	19	10.9
Student services	10.3	34.6	31.6	12.5	11
Health information/services	36.5	35	13.9	5.1	9.5

Knowing which were the top pages/services/applications that individuals used helped me to map out the information architecture by seeing which I should focus on including to create a usable service. Again, the most important services were tools for communicating and learning as shown in Table 2. However, different services were important for different user groups; no students said that the Intranet was important; very few users besides students said Facebook was important.

Table 2. Question 10: Which are the top pages/services/applications that you use?

Activity	Not important (%)	Somewhat important (%)	Important (%)	Very important (%)	Necessary (%)
Moodle	4.4	9.6	19.3	34.8	31.9
Email	7.9	2.2	9.4	45.3	35.5
Calendar	44.5	16.8	9.5	22.6	6.6
Schedules	24.1	18.2	30.7	11.7	15.3
SoleOps	15.9	34.1	28.3	16.7	5.1
Intranet	36.8	19.1	14	22.1	8.1
Winha	6.6	16.2	30.9	30.9	15.4
Pakki	7.3	19	26.3	32.1	15.3
iGoogle	36.6	18.3	17.6	19.1	8.4
Spotify	55.7	16.8	11.5	9.2	6.9
Facebook	28.9	13.3	16.3	27.4	14.1
LinkedIn	84.8	9.1	3.8	0.8	1.5
Twitter	85.5	8.4	3.8	0.8	1.5

Again, the question of why these systems were used the most and others not as much arose. Knowing why the systems are used helped me to understand which other types of systems and services would be advantageous for users, for example, how to spend less time on the computer while making the time spent more effective and productive. The

idea of making it more fun or interesting to use also arose, especially for students.

- Not necessary for work or studies
- Not important in my life
- Too complicated already
- Don't want to spend so much time on the computer
- Some music is nice in the background
- Communication between people is important
- Keep in touch with other people in my life
- Social life and work/study life are separate
- Chats are quicker than emails
- Habit or routine to use them
- Some are more fun than others

Designing and developing the virtual workspace portal directly from the user research allowed us to also integrate other options into the service to create a higher value for the user. Although we needed to pay attention to the customer segmentation, it was possible to either integrate the services directly into the demos or find some way to let users integrate them for themselves in their personalized workspaces.

- News sites
- Video viewing/TV viewing (Telkku.fi)
- Skype and chat programs
- Other email providers (Gmail, Yahoo, Hotmail)
- Blogs and forums
- Hobbies (gym, games)
- Jobstep
- Adobe Connect
- Dictionary/translator
- Web bank
- Local events
- HOPS

From a usability point-of-view, especially regarding system design, it was important to find out the situation with the current solution. According to Figure 14, most individuals use Pakki 1-5 times a week, and that is usually to find links to other services like email and schedules. Since there are already a good number of “regular” users, we can easily increase the value for them by developing Pakki according to the current issues and desired changes with the help of guidelines and principles I found from my research about service design, virtual and interface design, usability, and user experience.

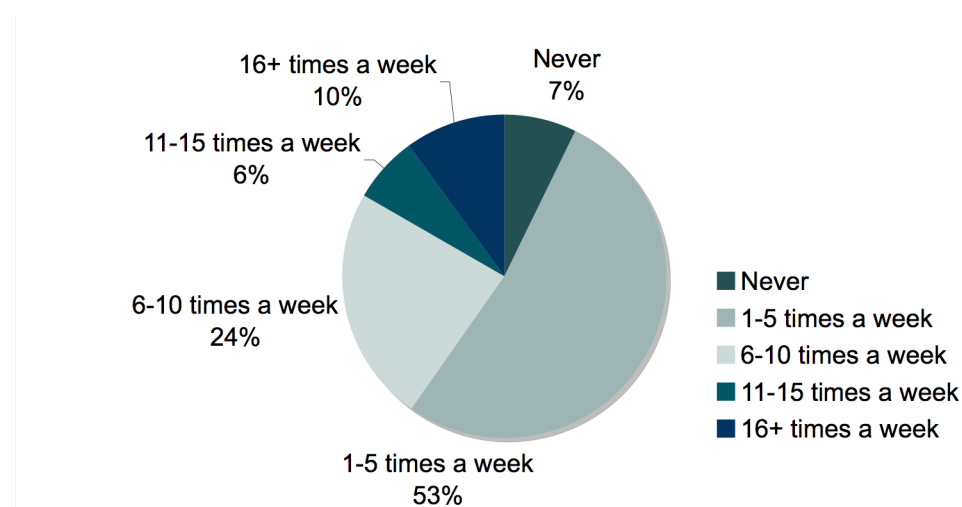


Figure 14. Question 13: How often do you use Pakki now?

In addition to how often an individual uses Pakki now, we wanted to know what they use it for, shown in Table 3 below. The activity that individuals use Pakki for most is accessing links and then other services, like forms and contact information. These are all simple tasks that users previously mentioned were sometimes difficult, like having to sign in multiple times or having trouble to find relevant forms or information. Simplifying these activities was one of our main goals since it was so common and often complicated.

Table 3. Question 14: What are the top activities that you use Pakki for?

Activity	0 times a week	1-5 times a week	6-10 times a	11-15 times a	16+ times a week

	(%)	(%)	week (%)	week (%)	(%)
Accessing links	17.3	39.6	18.7	15.1	9.4
Using school services	28.1	57.6	11.5	2.9	0
Finding forms	46	48.2	3.6	2.2	0
Finding contact information	37.4	53.2	6.5	2.2	0.7
Other	60.4	32.4	5	0.7	1.4

I could not know what other activities individuals use Pakki for at that time since I did not know how staff members or other students used it, so I asked an open question about any other activities besides the ones listed previously. Individuals responded with a few other purposes:

- School regulations
- Study grants
- Writing my thesis and the graduation process
- Menus

The first three activities are not usually used on a regular basis for students, but menus are since they change weekly. We easily were able to add lunch menu availability to the list of future portal integrations. The others would be integrated based on better display and organization of the information.

Activities were not the only things that could be factors contributing to how satisfying the new virtual workspace portal could be; it also included other elements and characteristics. To learn what those were, we asked another open question about how Pakki could be changed to better suit the user's needs and what his/her dream virtual workspace portal would be. It should be/have

- Faster and more reliable;

- Better interface (cleaner, easier to understand and use, simple);
- Work better on different operating systems and on mobile devices;
- Single sign in/no sign in for simple things (schedules, menus);
- Better email/communication system, possible integrated chat, also with the Helpdesk;
- More visible links/links that are relevant to me;
- Able to customize it for my own needs as my needs change through the studies/as projects change;
- Better integration/interaction between the programs NKUAS uses;
- Better calendar/schedule system, integrate room reservations;
- News and alerts about the school or subjects that are relevant to me (can I subscribe to someone's alerts, like a teacher being absent or a yoga class being cancelled?);
- Workspace available for remote/distance users also;
- Improved search functions and information acquisition e.g. contact information, opening hours;
- Sharing documents instead of sending many emails back and forth; somewhere to save, back up, and share my documents; possible group editing;
- Team viewer/group work support;
- Notification service instead of emails, too many emails; and
- Better feedback options.

This was the most useful question because I found out the main areas I could develop to create a satisfying service product. Working with Mr. Järvelä, I was able to figure out which elements would be part of the information architecture for the demo and which would not be possible at all or would need more funding to develop and integrate.

4.1.2 Stage one: using the questionnaire results

Overall, I had to focus on the fact that the final object was to design a *usable* and *useful* service product. Based on the information I gathered,

the best option was a **virtual workspace portal**. A virtual workspace portal accounted for such a wide variety of what characteristics users seem to require and desire, i.e. dynamic, integratable, personalizable, reliable, secure, user-friendly, and widely accessible across operating system platforms, as well as the assorted features. It combined a VLE, to account for the vital education activities, a PLE, to allow for user customization and management, and an EIP, to provide the improved communication and sharing tools.

We wanted the virtual workspace portal to provide a positive user experience and satisfy users, requiring a good interface and usability principles. Now that we knew what users seemed to want, we were able to choose Liferay's Liferay Portal as the best software and plan out the rest of the project's process and steps since some of the steps depended on Liferay's parameters. At this point I started learning how to use Liferay at the same time as creating the information architecture.

Based on the information, we decided to create a design that had a set of default pages according to the different user groups with a single login front page. Novice users would not be bombarded by a "link overload" or unnecessary portlets; advanced users could add more portlets and/or pages. It would be customizable and personalizable depending on the user's requirements. The front page has the information from the current Pakki that also allows a viewer of the site to access this information without logging in, but it is still available from his/her public pages after he/she logs in. The public pages also have contact details and any updates about the individual, such as leaves of absence or changes in room locations. We decided to create three separate default private pages, Home, Personal, and Work/Studies. Then I came up with the portlets that would be on each page, culminating in the information architecture. There were three different default user profiles because administrators and other staff members seemed to find the same characteristics important and request the same elements and features.

- Student:
 - Public pages: Pakki information, Contact information, Wall with activities and updates
 - Private pages:
 - Home: Calendar with schedules, Weather, Notes, Announcements, Activities, Search box (forms, subjects, users), Tag cloud
 - Personal: Email (Gmail, Hotmail), Document library, Image gallery, Bookmarks
 - Studies: Outlook email, Communities (eventually will replace Moodle courses), Moodle courses, Document library

- Instructor:
 - Public pages: Pakki information, Contact information, Wall with activities and updates
 - Private pages:
 - Home: Calendar with schedules, Weather, Notes, Announcements, Activities, Search box (forms, subjects, users), Tag cloud
 - Personal: Email (Gmail, Hotmail), Document library, Image gallery, Bookmarks
 - Work: Outlook email, Communities (eventually will replace Moodle courses), Community members, Moodle courses, SoleOps, Document library, Wikis, Alerts

- Staff member:
 - Public pages: Pakki information, Contact information, Wall with activities and updates
 - Private pages:
 - Home: Calendar with schedules, Weather, Notes, Announcements, Activities, Search box (forms, subjects, users), Tag cloud

- Personal: Email (Gmail, Hotmail), Document library, Image gallery, Bookmarks
- Work: Outlook email, Communities (eventually will replace Moodle courses), Community members, Document library, Wikis, Alerts

4.2 Stage two: “flat” mock-up interface interviews

Mr. Kosunen and I started to make some “flat” mock-ups in Photoshop, basic layout sketches, of how those pages and portlets could be organized. This stage was to make the layout and get feedback about them regarding the “feel” and “look” of the portal interface. Using Part 12 of the ISO 9241 (ISO 1996) standard, I wanted to know about the:

- clarity: the information content is conveyed quickly and accurately;
- discriminability: the displayed information can be distinguished accurately;
- conciseness: users are not overloaded with extraneous information;
- consistency: a unique design, conformity with user’s expectation;
- detectability: the user’s attention is directed towards information required;
- legibility: information is easy to read; and
- comprehensibility: the meaning is clearly understandable, unambiguous, interpretable, and recognizable.

(ISO standard 9241 1996; Opperman 2001)

I interviewed 26 individuals (17 students, 5 instructors, 1 administrator, 3 staff members) and showed them the following print outs, Figures 15-16, of the layouts as well as possible color options, Figure 17.

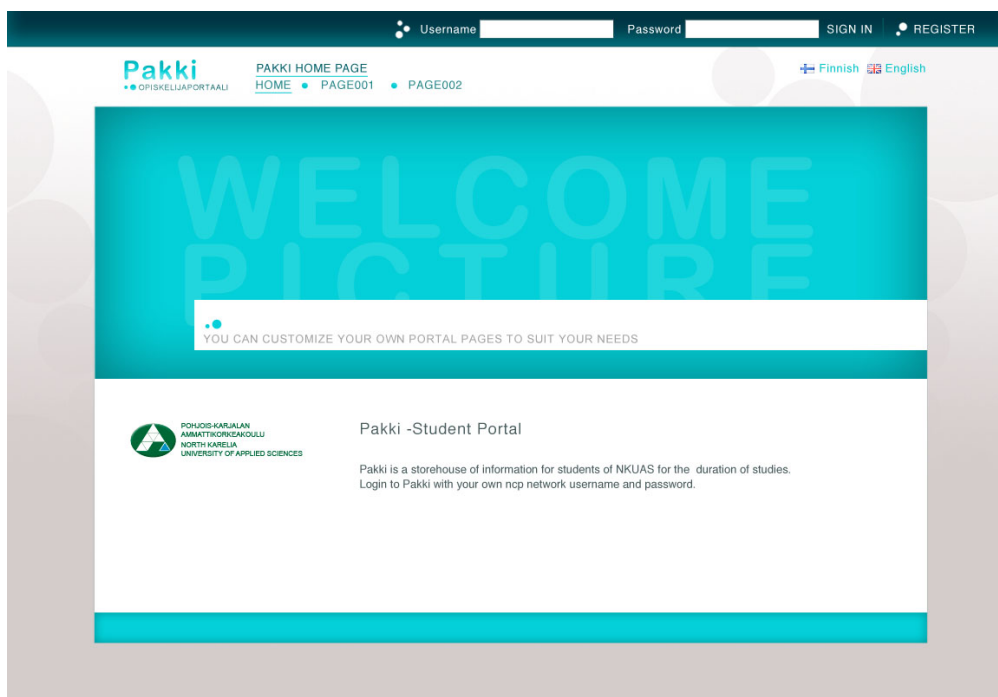


Figure 15. The Pakki virtual workspace portal front page. When users first navigated to the Pakki virtual workspace portal, they could find the information already available from Pakki without signing in.

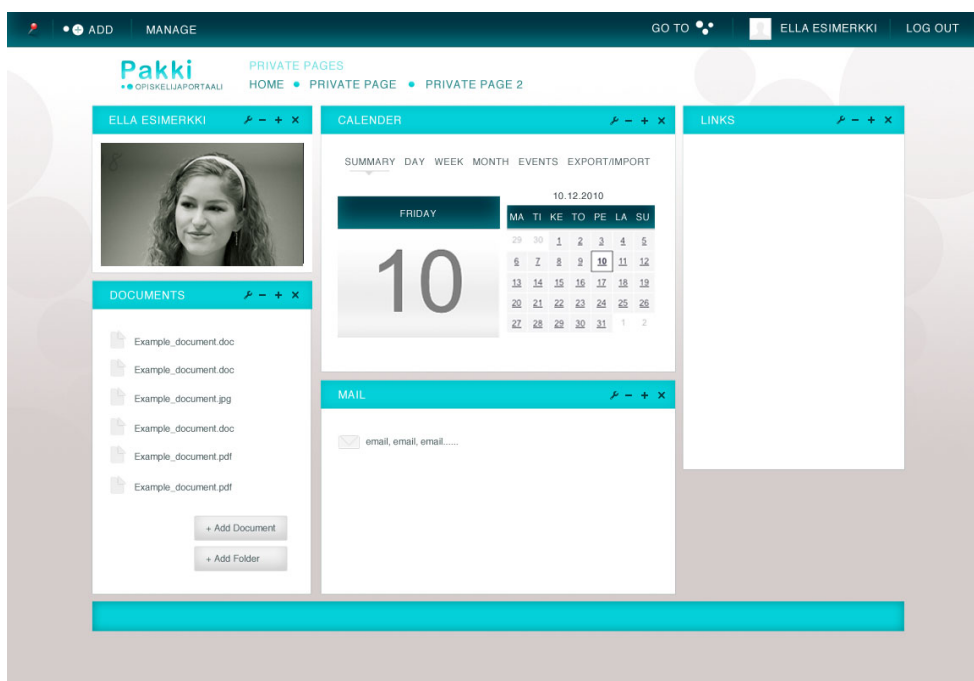


Figure 16. Home view of the personal pages after signing in. The same information was still available, but users could customize tools and

portlets after signing in, like their work/study calendar/schedule or their links.

This stage was the first time that I had officially gone to talk to users face-to-face and showed them something concrete. Even though we only had a rough mock-up at this point, it was crucial to get user feedback of our first layout attempt. The general feedback was positive and excited that something was being done to improve NKUAS's virtual services, something so necessary nowadays. Users commented that

- Week numbers on the calendars and schedules are needed;
- Separating the portlets would be better, now it feels too cluttered;
- Just seeing it flat makes it hard to imagine how to change things or personalize it;
- More icons for the different uses might be helpful;
- Navigation on the bottom also in case I have many portlets;
- + Basic visuals are clear and aesthetically appealing, modern, neat, "light" and "fresh," colors are nice; and
- + It looks easy and quick to understand.

Interestingly enough, some of these comments contradicted each other, such as the visuals being nice as they were and the visuals also being too cluttered. The perfect solution for this is one we already devised, to prepare a default workspace for everyone depending on his/her user group, i.e. student, instructor, or staff member, and let him/her personalize it if there is something he/she finds that he/she wants to change. Other comments, such as the week numbers, needed to be coded later on because it requires technical development that we did not currently have the funds for. Icons to depict the uses might have been better or color-coded pages, something that each user could personalize on his/her own pages. A navigation bar at the bottom was a good idea that could be solved by locking the top navigation bar in place. This way the navigation bar followed the user's scrolling activity to be more usable.

Combating the difficulty in testing the current version due to its “flatness” was solved later in the interactive user testing stage.

I also wanted to include color variations, seen in Figure 17, that users could choose from in addition to other themes, to be designed later, besides the default shown. They would also be able to upload their own background photo. Individuals that I interviewed said the color possibilities were nice, but to also have the option to keep the light gray background and just change the menu bar and headers.



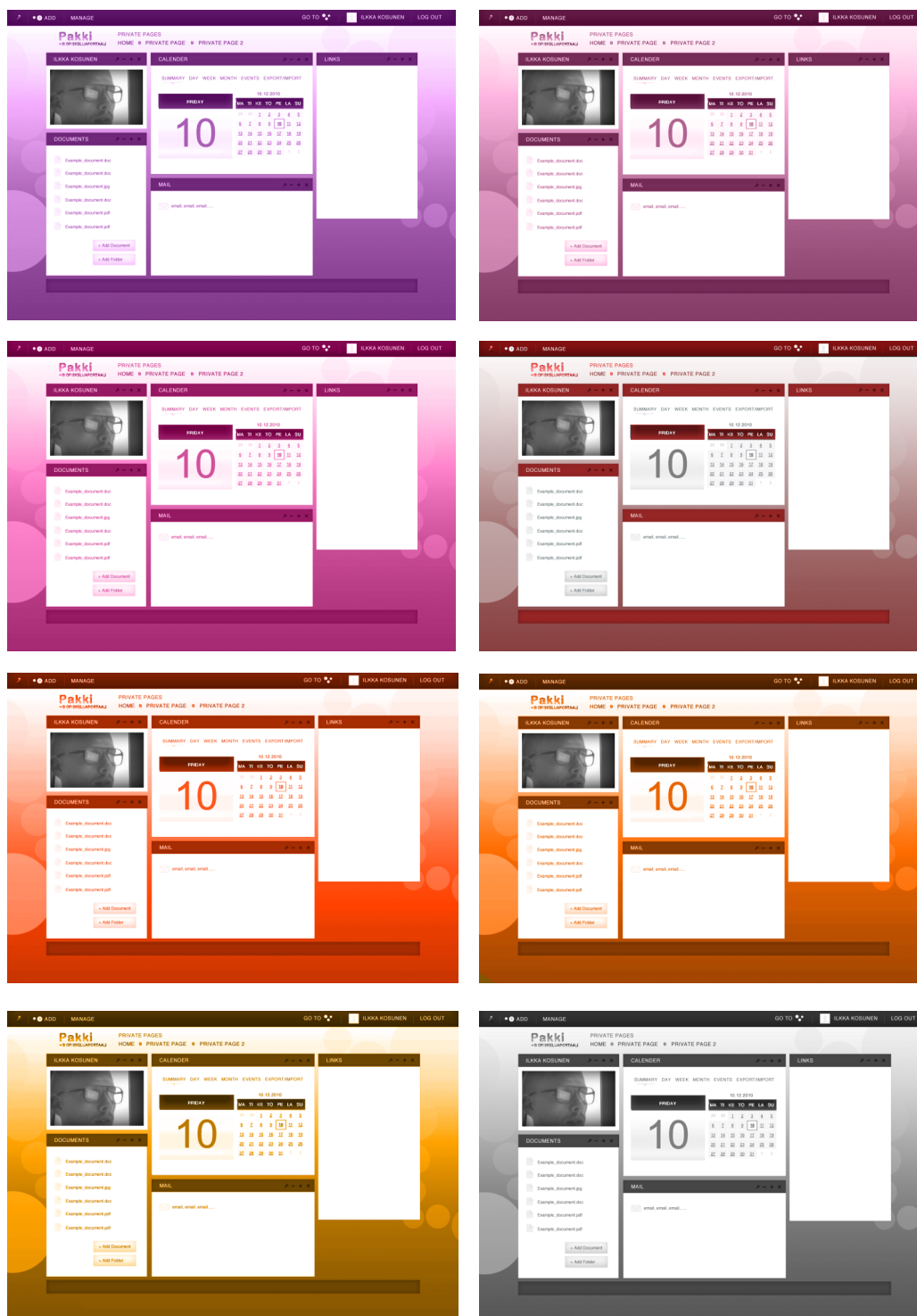


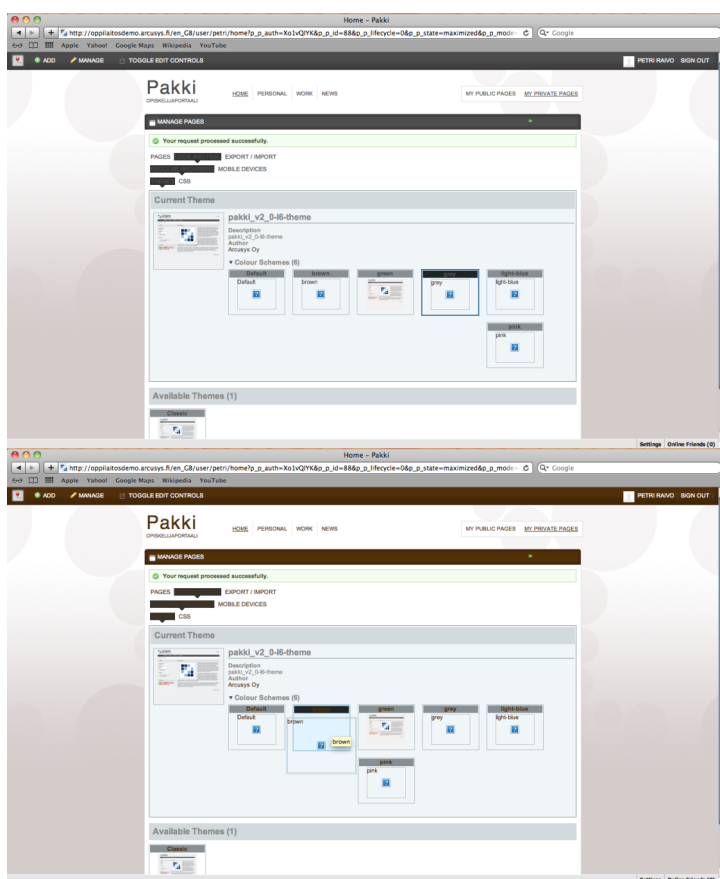
Figure 17. Possible color variations to personalize the workspace. Users' own photos as a background are also possible.

Throughout the project thus far I had been practicing with Liferay and learning to manage the platform. The next stage was to make the theme on Liferay and create the interface by adding the portlets according to the

information architecture I designed, which was based on the user research from Stage One's questionnaire and the background information on themes like usability and the user experience.

4.3 Stage three: Liferay mock-up interviews and questionnaires

Another member of the Adepte team, Mr. Dominik Trnecka, coded the theme with some of the color variations, visualized in Figure 18, and I started to construct the different default user profiles, i.e. student, instructor, and staff member, by adding the portlets, customizable and manageable components, to the different user groups, listed in 4.1.1 like a calendar, email frame, and notifications.



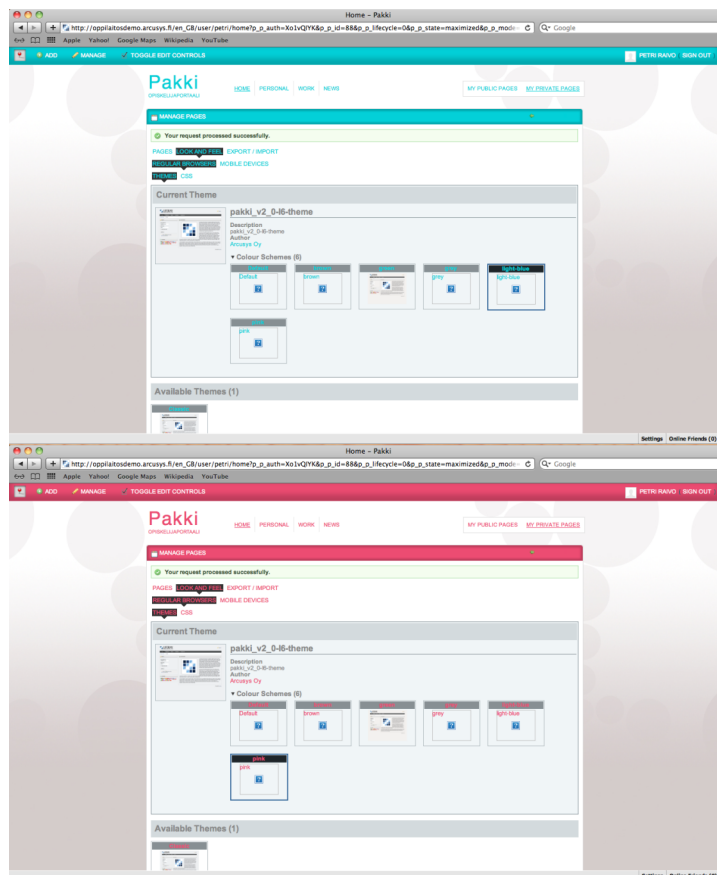


Figure 18. Some examples of the color themes working in Liferay and how to change them. There is brown, gray, teal, and pink to choose from.

Since I was focusing on creating a positive holistic user experience by designing the service to be more usable taking the usability principles into account, I needed to go talk to users again to make sure our progress was on the right track. A few elements changed when we were actually building the portal in Liferay, like having multiple pages, such as Home, Personal, and Work/Studies, and the placement of the portlets and the headings. Now that I had more knowledge and experience with Liferay, this allowed me to know which portlets were already available without any extra integrations or coding since some, like an integrated Microsoft Outlook email portlet, require funding and could not really be added yet. This provided a gap in the user research and the design principles. As a designer, I had to make choices about the placement and required portlets. This round of user testing was the first time users saw the almost completed demo after combining the research about the

characteristics, elements, tools, and features they seemed to want with the feedback about the “look” and “feel” of the mock-up default interfaces.

I interviewed and gave questionnaires to 20 users from different NKUAS campuses, 13 were students, four were instructors, and three were other staff members, some from the same group as Stage Two and some new users to get a fresh perspective. I used a combination of interviews and questionnaires to gather the information; the questionnaire was a modified version of the same one I used in Stage One previously with printouts of screenshots of the virtual workspace portal at that point in the process. I discussed the issues with the individuals and asked more in-depth questions about some of the benefits this virtual workspace portal could present and if there were any elements they could predict would still be handy, currently or in the future.

At this stage I really wanted to focus on how users perceived the success of combining the data I gathered in Stage One with the visual information I gathered in Stage Two. The following figures, Figures 19-23, are screenshots of the various default pages, working in Liferay, that individuals were shown on paper along with the questionnaire and interview. These are the pages that a student would start with when they first get access to the virtual workspace portal.

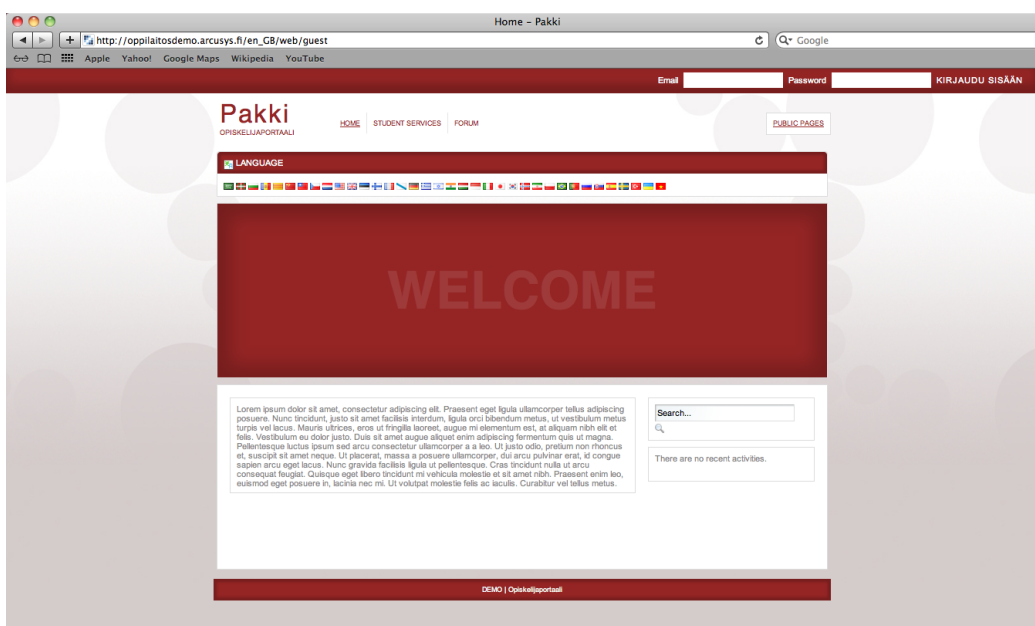


Figure 19. The default front page.

Figure 19 was the page a user would see when he/she first navigated to the Pakki page. It was not cluttered and had the information already available in Pakki.

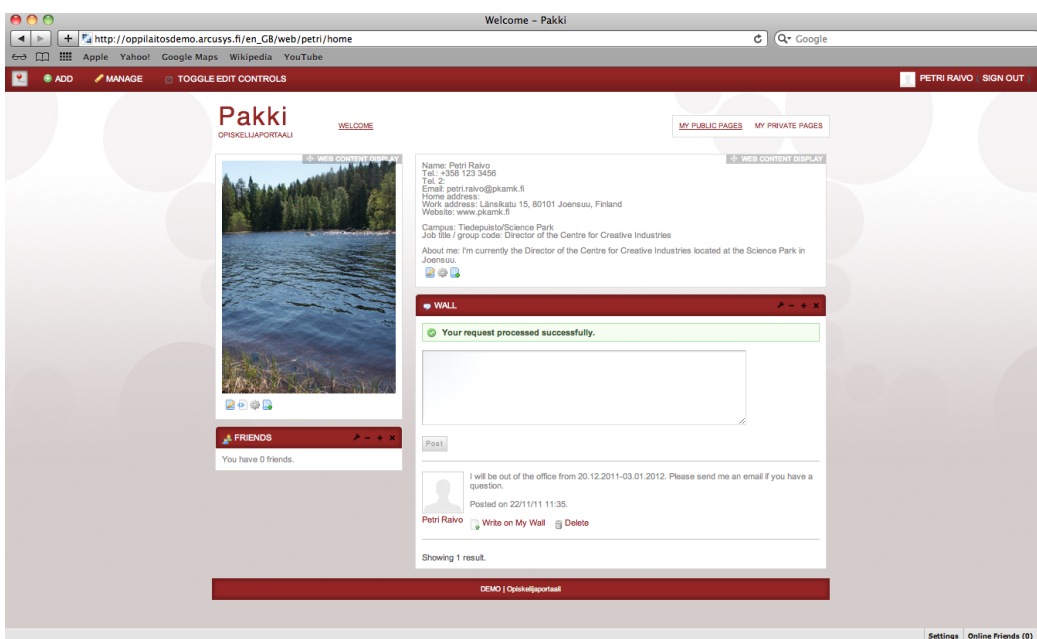


Figure 20. A user's public Home page.

This page in Figure 20 was the user's public Home page, which was visible to everyone and allowed users to notify others about their actions, like being on sick leave, and contact information. The public pages still had access to the information from Pakki, but users could also move that specific information, such as links for graduation, to their private pages.

When a user signed in, they had access to their private pages, full of personalized and customizable tools that could help with their work/study activities as well as in their personal lives if they want. As shown in Figure 21 depicting a user's private Home page, some of the possible portlets I designed to be the most usable and useful in the information architecture are displayed. Each of these could be changed, for example weather information from different locations.

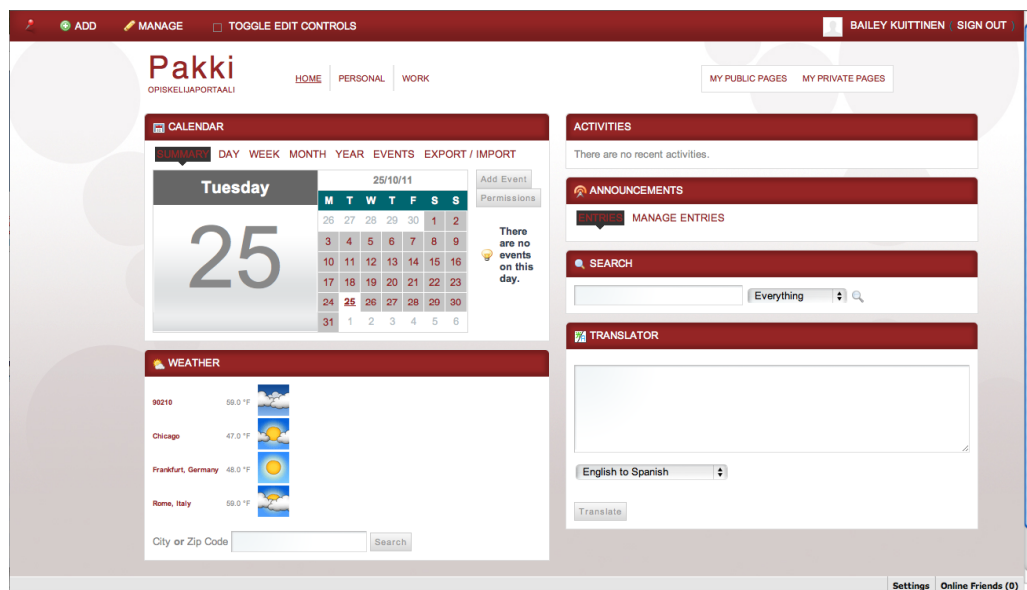


Figure 21. A user's private Home page.

The private Personal page, Figure 22, allowed users to collect portlets that they needed for their personal life. One main element of the design was that users were able to customize the portal to suit their needs; these are simply the default pages with the basic portlets that every user assigned a “student” user role got as their default workspace. If they were more advanced users, these pages and portlets could also be separated or added on to. Figure 22 shows things students might need for their personal life, but these can be divided and put onto its own page completely. For example, if a user has many photos and wants to have an entire page of photos, they are able to do that by adding another page after the Work page completely dedicated to photos. They would, in that case, probably more the Image Library to that page and add other portlets, like an image viewer, to that page.

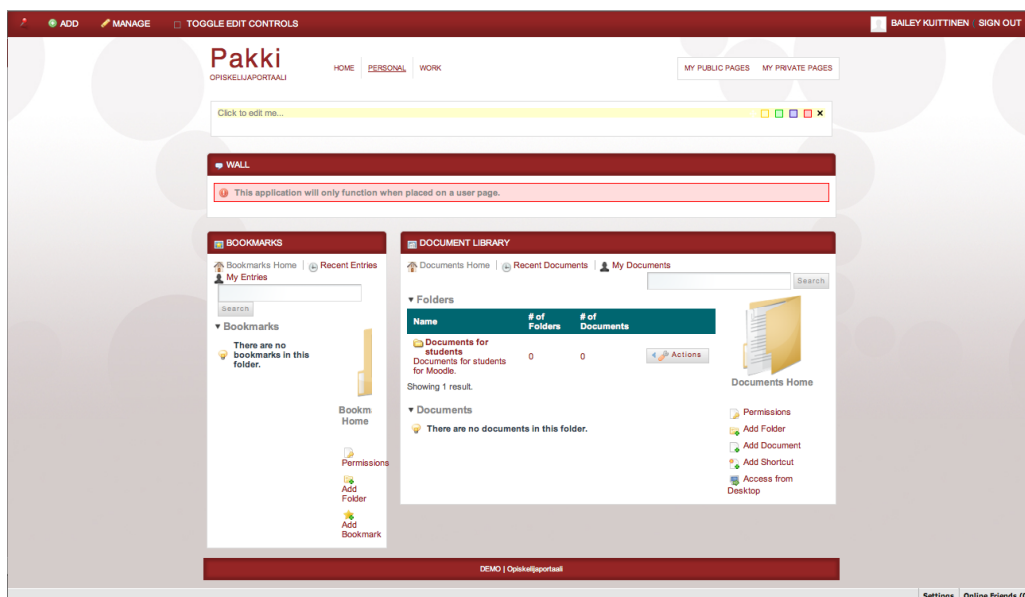


Figure 22. A user's private Personal page.

A user's private Work page had access to their Microsoft Outlook email and Moodle courses, both would be integrated when more resources would be available. This would be more customized and personalized after a user interacts with the portal more. Some users might add things like games or comics to their Personal page, or even create a separate page specifically for that.

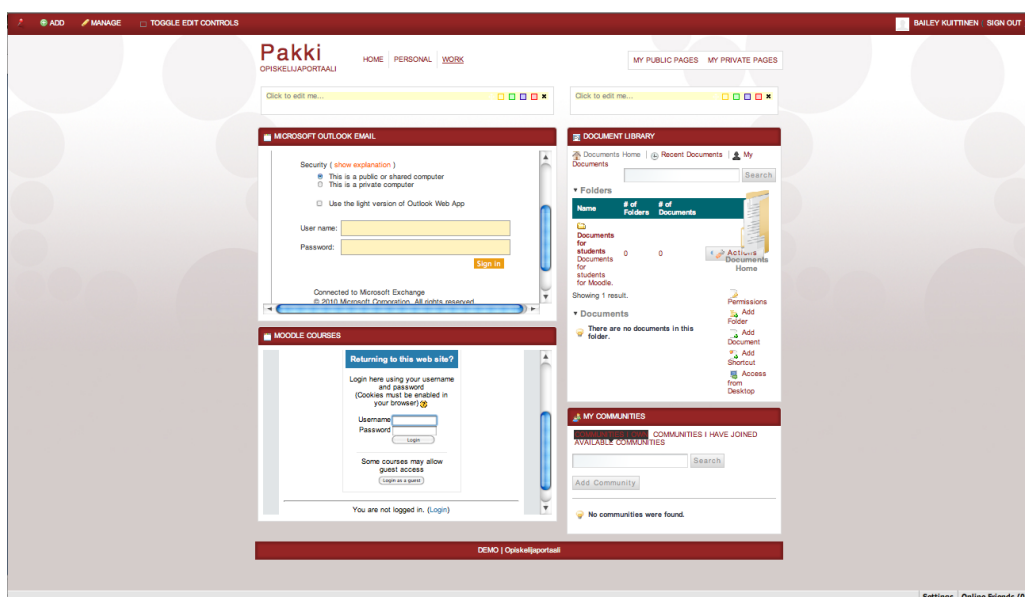


Figure 23. A user's private Work page.

The users I interviewed were mostly satisfied but did have some questions that I could not answer at that time, such as how soon it would be implemented by NKUAS and how the co-operation between NKUAS and Savonia University of Applied Sciences (located in Kuopio, Finland) would affect the prospects of this project. Other issues could be possible but required more resources to develop, like better and more completed translations of the different portlets and completed integrations compared to web frame displays, iFrames. iFrames simply embedded and constrained a webpage to a frame displayed on the portal page, such as the Microsoft Outlook Exchange email system in Figure 22, and required real technical integrations for it to work properly. Some other issues were:

- mobile versions;
- syncing with different services, like Google; and
- advanced users and their special rights and access.

These performance issues will be solved at later stages of the design and development process after the demo is complete when more resources would be available. However, the next step was to interact with users and see if we were successful in creating good usability and a positive user experience .

5 USER RESEARCH AND TESTING: PART TWO

The first part of the design and development stages consisted of user research, which was important to find out the background information such as the solutions at that time, the issues with those solutions, what users seemed to need and/or want, and how users used virtual services for work/study and personal activities. Even though that information was extremely important to create the framework, design process, and action plan, more value came from seeing how users interacted with the service product. I used the hard data to design and develop the service needs to also have the user interaction. This allowed me to check the usability and user experience I was trying to achieve through the design and interface.

5.1 Stage four: user testing shadowing and interviews

During this stage I wanted to observe the interaction between users and the service product according to some of the standards and principles I found during my theoretical research. For example, I used the “dialogue requirements” from Part 10 of the ISO 9241 (ISO 1996) standard detailing the:

- suitability for the task (does it support a user’s task accomplishment?);
- self-descriptiveness (how intuitive, easy to understand, or explainable is the service?);
- controllability (is a user able to control the interaction – use, speed, complexity, etc. – with the service?);
- conformance with user expectations (does the service meet user expectations in line with current practices?);

- error tolerance (are the objectives/expectations still achieved/satisfied easily by the user or what are the revert mechanisms?);
- suitability for individualization (is a user able to personalize/customize/modify the service to suit his/her own needs/requirements/desires?); and
- suitability for learning (can a user learn the service well and how easy is it to do so?).

(Source: ISO standard 9241 1996; Opperman 2001)

To achieve this, I went to NKUAS campuses to sit with 17 users (12 students, two instructors, three novice users as controls) and observe their use of the virtual workspace portal. I tried to interact with them minimally in order to check the portal's usability and learnability. I gave them simple tasks, such as signing into their email to and sending me an email, adding some bookmarks to their bookmark list, updating their statuses, such as being on sick leave, and changing the color of the theme.

10 out of the 17 users said it was easy to complete the tasks after they became oriented to the portal system. Users said it took about five minutes to orientate themselves and feel relatively comfortable with it. (An external factor that might have affected this was using someone else's computer, something I planned to remedy in the next stage of user testing.) After that orientation period, it took less and less time for users to complete the tasks. This showed that the service was probably quite usable for that sample of individuals. Satisfaction levels were quite high due to a surprising reason – that they had fun, it was new, and exciting, and it was different.

Three out of the other seven users that said it the virtual workspace portal was not so easy to use said that it was because the complete integrations were not yet finished, and two people said they had trouble using Mac computers.



Figure 24. During user testing at the Science Park.

Users mentioned that the portal was

- + interesting and fun to use;
- + nicely customizable for personal needs;
- + easy to understand and control, no need to add anything extra if it is not wanted or needed;
- + produced a good feeling when something was understood;
- + fast;
- still containing some bugs, like the translations, full integrations, some portlets not supported; and
- good but did not know what to do when there was an error or something went wrong.

Previous stages were focused on gathering information from users, but this stage gave me a new spark of motivation because I saw the users' eyes light up and how excited they got about this service product.

Knowing that users were satisfied and enthusiastic was an amazing feeling for me as a designer, especially after so much effort and work. The users' excitement made all the difficulties worth going through and overcoming. It also motivated me to continue pushing the project through NKUAS's bureaucracy organization and traditional mindset.

5.2 Stage five: one-week user testing and diaries

When I completed the shadowing and interviews, I gave five interested individuals (four students, one staff member) user accounts so that they could test out the service for one week. During that time, they kept a diary of what they used it for, how often (amount and length of sessions) it was used, its benefits and detriments, and how it could be developed in the future. We will take a good majority of those suggestions into account when we continue to design and develop the virtual workspace portal.

5.2.1 Stage five: results from the one-week user testing and diaries

Most users simply wanted to play with the portal and see what types of services it could provide. Experimenting for a longer period of time after I showed them the portal was the best way see the longer-term uses.

Used for

- entertainment and fun;
- gathering work/study resources in one place;
- managing time and efficient activities;
- saving documents;
- checking grades and email; and
- checking/submitting assignments for courses.

Knowing what users ultimately did with the portal showed me if the uses I researched before were actually the activities users used the portal for.

This showed that they did exactly what we expected with the service, although more uses could be found when users get more comfortable with it and we develop it more. Future development possibilities means that the service product will not become obsolete in the future, one of the characteristics resulting in our choice of using Liferay as the platform and an aspect important to me as a designer.

How often a user used the portal translated into what they did with it. Some of them spent a lot of time moving portlets around and making the space their own while others simply used it for a short time and very efficiently.

- User 1: 4 log in times, 7 hours
- User 2: 6 log in times, 3 hours
- User 3: 9 log in times, 7.5 hours
- User 4: 2 log in times, .5 hours
- User 5: 4 log in times, 2 hours

The following benefits were aspects we wanted to focus on before, showing that we were on the right track. The detriments are the aspects that will be developed in the future when we have more funding since now we only used the portlets that were originally available with Liferay.

Benefits

- everything in one place
- secure
- usable
- can make it my own, move portlets around and add different ones for my own needs
- stylish
- would only need to sign in once, but that option is not available yet
- easy to move something, but also a detriment
- helps to not have to spend time searching for so many things

Detriments

- not all integrations are complete
- sometimes stalls
- right click to manage would be helpful
- more themes available
- pre-set pages for different uses like news or a football community
- better error messages
- easy to move something, but also a benefit

Users also said that there were some elements they'd find helpful in the future after using the portal for a little while, such as

- some games or creative outlets;
- common work areas for people;
- forums and chats, maybe even to trade goods like when going on exchange and you do not need something;
- library database included where we can read books or journals from other databases;
- help system for the services, very good instructions for use, Helpdesk and how to contact them in case of problems; and
- ways for users to give feedback or participate in the development like suggesting their own portlets.

In the previous stage I saw the users' excitement, which really motivated me, but sometimes that excitement dies after a user becomes acquainted with a product and the novelty wears off. The fact that users still felt that the portal was beneficial and they wanted to keep using it showed that it wasn't only short-term satisfaction based on its novel nature, but that the portal served long-term uses and needs.

By not gathering any specific information or asking particular questions I didn't guide individuals into answering in a certain way. They were able to

give their opinions very openly, especially about their experiences and feelings, details both necessary in the usability and user experience of a service product such as the virtual workspace portal.

5.2.2 Stage five: user personalization example

Even though users told about the user experience and how usable the portal the, I wanted to see some example of what users created when they had the chance to use the portal for longer. Personalizing and customizing this Home page justified that a user felt comfortable and interested enough to spend time using the virtual workspace portal even without the integrations. A customized workspace such as the one shown in Figure 25 was a culmination of the usability and was a visual representation of the user experience.

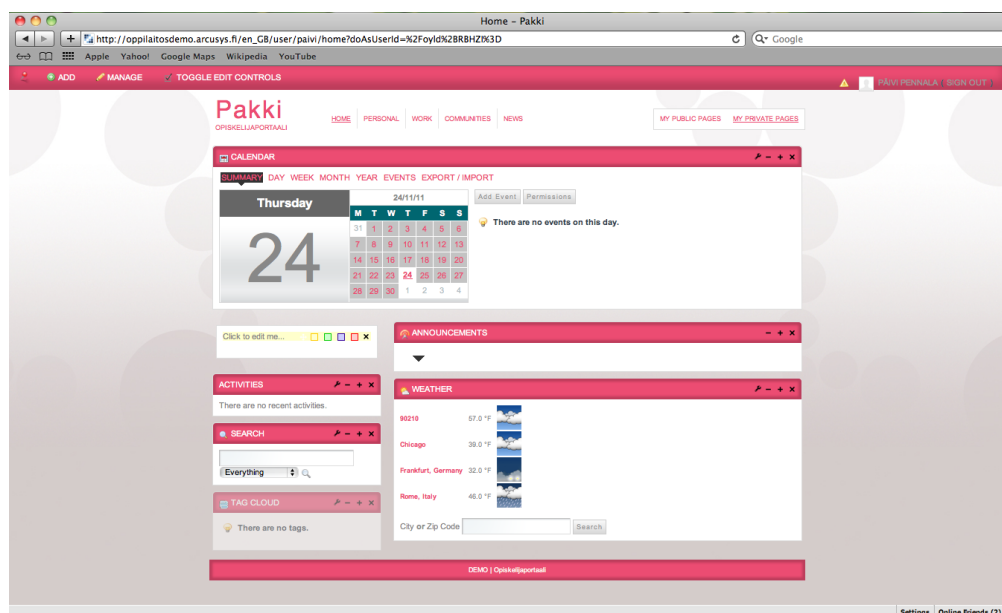


Figure 25. One user's personalized Home page.

This individual reported that she used the virtual workspace portal for about three hours and really enjoyed the experience. She said she usually had problems with so many programs and applications that she had to learn in order to do her work well, but this virtual workspace portal was very usable and fun. She felt that a service like this would help her

communication with other colleagues and also her students, especially for group projects that she assigns often. She especially liked the community feature that would allow her to see some of the activities or interest groups that she could participate in. The possibility to save all her documents in one place and not have to always worry about having a back up made her feel more secure, although the process to upload a file should be improved. She wanted to try it again when the integrations are complete.

The simple fact that this self-proclaimed novice user was able to learn the portal well enough in one week to be able to customize and personalize her pages testified to the usability, understandability, and learnability. The fact that she wanted to continue to use the portal after the trial period attested to the product meeting a good majority of the user's needs, like being fast and actually functioning. It also helped to accomplish the various tasks her job required, such as helping with communication as well as work ease and productivity. She was able to control her interaction with the portal by interacting with it in steps.

She started with the default instructor pages that had the basic portlets, determined by the information architecture I designed based on the user research and testing. After a brief acclimation period, she was then able to advance to the next phase of interaction with the portal, personalization and customization. She began this phase in small and simple ways, such as reorganizing the layout of the portlets on the various pages or even adding extra pages for specified uses, like news. The interface of the default pages was incredibly important, especially at the beginning, because it needed to be simple enough for all users to understand and feel comfortable with, but similarly promote a user's personalization and customization after that acclimation period ended.

As mentioned before, the default pages for each user group, student, instructor, or staff member, have portlets that those users said they wanted according to the user research I conducted. Each default page

also has a pre-set theme, i.e. the layout with the spheres and the red color scheme. The user who created the Home page in Figure 25 decided to customize the way the portlets were arranged as well as the color scheme from red to pink. Other users would be able to similarly change the theme, the basic layout, as well as the color scheme or even upload their own photo as the background image. Since this was still the demo version, the option to have a user's own photo as part of the theme was not available but would be another part of the further development when we have more resources to allocate to technical functionalities.

The same went for the various integrations, for example from Microsoft for calendars and email and Mimosa for schedules and bookings, which would create more possibilities for portlets and uses for the portal. More specialized pages besides Home, Personal, and Work/Studies would also be possible. Extra pages can be pre-made, like News or Thesis, or users can structure the information according to their own preferences and organizational framework. Users could choose to structure their pages according to category, like Tools with Notes, Weather, Calculator, and other helpful portlets, or by activity, like Thesis with Notes, Bookmarks, Document Library, and the Communities related to the thesis, possibly containing the collaborators on the thesis project as members. These choices were part of each individual's user experience, but the default user interface provided the steppingstone to customize the interface and, therefore, increase the portal's specific usability for each user.

6 EVALUATION AND DISCUSSION

6.1 Results of the framework and methods

I approached the design and development of this kind of service product utilizing systems design methods, like rapid prototyping design (RAD) and joint prototyping design (JAD), especially since the service product was so heavily based on technology, being an amalgamation of a virtual environment for learning (VLE), a personal learning environment (PLE), and an enterprise information portal (EIP). Traditional service design methods would have focused more on the customer journey, an impossible feat with our available resources and over 4,000 potential users. Instead I focused more on the usability factors and the user experience. This allowed me to produce a usability function based on the elements, characteristics, and factors that were important for the service product to be considered successful, such as more reliable, faster, system interactions and integrations, personalizable, team and group work support, developable, not static, visually appealing, easier to use, took all user groups into account, and educationally beneficial. Despite accomplishing my goal, I had to overcome many obstacles.

Being involved with this project from its inception with my seed of an idea to the completed sapling of a demo was extremely rewarding. I was able to observe and participate in the product's maturation and realization as well as monitor its progress and adjust it in ways I found necessary. I had a great opportunity to work with inspiring, dedicated, intelligent professionals who had various backgrounds and expertise. Our values and objectives were similar, but our methods and perspectives differed, giving us a wonderful blend of team members. Throughout the whole project I worked as a designer, although not in the classic sense of a graphic designer, and from the usability frame of reference. I know this angle was a unique perspective on the team and they really appreciated all the effort I put into the project.

The hardest part about the project, but one of the most beneficial, was probably the circular cycle involved in the development and design, a phenomenon that is common especially when merging background information and user research and testing results. It proved quite difficult at times because I felt like there was never any end to the research and changes I had to make as well as constantly being besieged by information; sorting through that information and picking out the valuable parts was time-consuming and made me sometimes wonder if I was overlooking or discounting an important fact. That made me feel a bit unsure of the whole process and if the service product was progressing positively.

6.2 Personal and professional growth

I often had doubts if I was doing a good job and I did not really have a superior or a member of the team that was as active as I was to reassure me of my good work. However, Mr. Jari Järvelä from Adepto Oy was very supportive, grateful, and provided positive feedback during our development discussions and planning meetings although it might have been more advantageous if Mr. Järvelä had been involved to a greater extent. His full schedule, of course, was understandable since his company, Adepto Oy, was also a start-up at that point and was his main priority.

Consequently I had to learn to trust myself as a designer as well as a project manager. My confidence in my abilities in both areas dramatically increased; that belief in oneself is, especially in the creative fields, a characteristic every successful individual needs to stay motivated and achieve great things. At the beginning, as mentioned before, I constantly wanted external validation but during the project I learned to trust my abilities and myself more which allowed me to have the courage to take charge and do what I thought was right.

Available resources and time were also big factors, especially regarding how they limited me and the whole process, such as other competing responsibilities, NKUAS's schedule and shifts in the organization, and funding options which affected what integrations we were able to incorporate in the demo version. However, these circumstances, and the ability to overcome them, are some of the best learning experiences and can often separate the good designers and innovators from the mediocre. Even though I had been involved in professional design projects through my own business and in collaboration with other companies, this was on a much larger scale in terms of potential users and advantages, importance, longevity of use, and possible future implications.

It was also the first time I had to be more aware of the technical specifications; I literally had to learn how to use the Liferay software to be able to build and test the default user groups and scenarios. This helped, though, since I almost considered myself a novice user at that point so I was able to incorporate my own involvement into the design and development of the service product as well as the user research and testing. In a way this was like role playing or creating user scenarios with myself. I also had a bit of personal background knowledge and experience since I was involved with NKUAS as a student and had been working as an instructor as well.

Working on this subject as a thesis project gave me the opportunity to develop my professional skills in the important emerging field of technological service products, especially in the educational sector and focusing on usability and project management. I was always interested in service design as an immaterial product and how it translates into and interacts with a material product, such as a computer in this case. Additionally, for my entire personal development as a designer, the relationship between how a corresponding service and product connects with and affects the dual relationship between its usability and the user experience as well as the factors, elements, and characteristics that

affect those, like the user interface in this situation. It also gave me the opportunity to get a significant and valuable recommendation for my experience, ability, and connections in the field I wished to work in.

6.3 Ethical points and reliability

I was definitely pleased with how well the project suited my principles and future professional goals. It was important to me to be able to help people in concrete ways in addition to not creating additional waste that would be detrimental to the environment. I knew that working with service design would allow me to do that. Designing a successful virtual workspace portal was going to assist people with their work and studies. Furthermore, it provided entertainment and a feeling of support and caring from NKUAS. I was then able to see the larger picture and how the service and product interacted and fortified each other.

The information I gathered was overall quite reliable. All values and results were calculated through the Typala feedback and questionnaire system provided by NKUAS. The distribution of respondents and users was also excellent because I had students, instructors, and staff members as part of the research and testing groups. This provided a wide range of user experiences, requirements, and perceived desires. However, there were probably many personal contacts that responded to the questionnaire simply to help me with my research, although I do believe they answered all of the questions honestly.

6.4 Further development and project continuation

The aim of this thesis was to design a demo version of NKUAS's virtual workspace portal that I will continue to develop as a business opportunity in collaboration with both Arcusys Oy and Adepto Oy. If all goes as planned, the four parties working on the project, the aforementioned

companies as well as my own company, Communicon Oy, and NKUAS, will sign a contract detailing how to proceed with the project. When a decision is made, we will be able to begin the integration of the other systems that proved to be so key. Without the funding, Arcusys Oy, the company in charge of the back-end technical development and support, is not able to spend their own resources to code the integrations for Microsoft Sharepoint, Mimosa, SoleOPS, WinhaWilla, and the other various programs and applications employed by NKUAS.

Since the aim of this thesis project was to only make a demo version based on user research, there are many future steps that we will need to take if there is a positive decision to continue developing this service. The first step after the contract will be to make more user profiles and let more users test the beta version. At the same time we will begin to complete the integrations. Our objective is to launch the new Pakki virtual workspace portal for the 2014-2015 academic year.

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List of abbreviations used

ABBREVIATIONS

EIP	Enterprise Information Portal. They are single-entry portals that integrate other systems, applications, and programs in one web-based interface with customizable portlets.
HCI	Human-computer interaction. How and how to improve the interaction between human users and computer programs and systems.
ICT	Information and Computing Technology. The sector that deals with technological and computing services of which both Arcusys Oy and Adepte Oy are part.
IFIP	International Federation for Information Processing. A group of professionals discussing current HCI issues.
ISO	International Organization for Standardization. A worldwide organization that researches and publishes standards and best practices, as well as qualifies parties as such, in a variety of areas and industries.
JAD	Joint Application Design. A type of design process in systems design where a team of professionals works together to design and system.
NKUAS	North Karelia University of Applied Sciences. It was the main client for the project.
PLE	Personal Learning Environment. An offshoot of a virtual learning environment that lets users customize and manage their own learning activities.
RAD	Rapid Application Design. A type of design process in systems design where designers use a continuous cycle of prototypes and user feedback to create a product that satisfies users.
VLE	Virtual Learning Environment, or, more appropriately, Virtual Environment for Learning. A system that can include a Learning Content Management System with functionalities like courses and material sharing.

NKUAS Virtual Services Questionnaire

1. What is your age range?

Answer	Number out of 139	%
Under 18	0	0
18-24	48	34.5
25-34	37	26.6
35-49	37	26.6
50+	17	12.2

2. Which user group do you fit in best? (Select all that apply.)

Answer	Number out of 139	%
Student	105	75.5
Instructor	17	12.2
Administrator	4	2.9
Staff member	22	15.8
NKUAS affiliate	0	0
Other	2	1.4

3. How many years have you been involved with NKUAS?

Answer	Number out of 139	%
Less than 1 year	27	19.4
2 years	17	12.2
3 years	38	27.3
4 years	20	14.4
More than 4 years	37	26.2

4. How many hours a day do you use a computer for your work/studies?

Answer	Number out of 139	%
Less than 1 hour	16	11.5
2 hours	35	25.2
3 hours	14	10.1
4 hours	21	15.1
More than 4 hours	53	38.1

5. How many hours a day do you use a computer for your personal life?

Answer	Number out of 139	%
Less than 1 hour	53	38.1
2 hours	47	33.8
3 hours	17	12.2
4 hours	13	9.4
More than 4 hours	9	6.5

6. How would you rate your technical skills? (1 is the lowest, 5 is the highest)

Answer	Number out of 139	%
1	0	0
2	6	4.3
3	48	34.5
4	61	43.9
5	24	17.3

7. How satisfied are you with the current NKUAS virtual services?

Answer	Number out of 139	%
I don't know	6	4.3
Very dissatisfied	4	2.9
Neutral	41	29.5
Satisfied	60	43.2
Very satisfied	3	2.2

8. Why are you satisfied or dissatisfied?

- + The new webpages are much better than the old web pages
- + A lot of information is available
- + Enough for my needs and I can find the links when I need them
- + Everything works the way it should
- Slow and many glitches
- Too many sign-ins (impractical just for schedules, so many "clicks")
- Signed out after a short time
- Separate systems and programs do not work well together
- Structure of the website is complicated and hard to find the relevant information
- So many things I do not need
- Visual interface is confusing and not clear
- Does not work well with all operating systems
- New improvements are not really improvements, actually made it worse

9. Which are the top activities you use the computer for, both personally and for work/school?

Activity	Not important (%)	Somewhat important (%)	Important (%)	Very important (%)	Necessary (%)
Email	0.7	2.2	10.1	45.7	41.3
Schedules	22.2	14.8	17	25.2	20.7
Grades	19.3	17	20	25.9	17.8
Communicating	2.9	7.4	16.9	46.3	26.5
Library services	13.9	26.3	29.9	19	10.9
Student services	10.3	34.6	31.6	12.5	11
Health information/services	36.5	35	13.9	5.1	9.5

10. Which are the top pages/services/applications that you use?

Activity	Not important (%)	Somewhat important (%)	Important (%)	Very important (%)	Necessary (%)
Moodle	4.4	9.6	19.3	34.8	31.9
Email	7.9	2.2	9.4	45.3	35.5
Calendar	44.5	16.8	9.5	22.6	6.6
Schedules	24.1	18.2	30.7	11.7	15.3
SoleOps	15.9	34.1	28.3	16.7	5.1
Intranet	36.8	19.1	14	22.1	8.1
Winha	6.6	16.2	30.9	30.9	15.4
Pakki	7.3	19	26.3	32.1	15.3
iGoogle	36.6	18.3	17.6	19.1	8.4
Spotify	55.7	16.8	11.5	9.2	6.9
Facebook	28.9	13.3	16.3	27.4	14.1
LinkedIn	84.8	9.1	3.8	0.8	1.5
Twitter	85.5	8.4	3.8	0.8	1.5

11. Why do you use these pages/services/applications/systems the most and others not as much?

- Not necessary for work or studies
- Not important in my life
- Too complicated already
- Don't want to spend so much time on the computer
- Some music is nice in the background
- Communication between people is important
- Keep in touch with other people in my life
- Social life and work/study life are separate
- Chats are quicker than emails
- Habit or routine to use them
- Some are more fun than others

12. Are there any other activities?

- News sites
- Video viewing/TV viewing (Telkku.fi)
- Skype
- Chat programs
- Other email providers (Gmail, Yahoo, Hotmail)
- Blogs and forums
- Hobbies (gym, games)
- Jobstep
- Adobe Connect
- Dictionary/translator
- Web bank
- Local events
- HOPS

13. How often do you use Pakki now?

Answer	N	%
Never	10	7.2
1-5 times a week	73	52.5
6-10 times a week	33	23.7
11-15 times a week	9	6.5
16+ times a week	14	10.1

14. What are the top activities for which you use Pakki?

Activity	0 times a week (%)	1-5 times a week (%)	6-10 times a week (%)	11-15 times a week (%)	16+ times a week (%)
Accessing links	17.3	39.6	18.7	15.1	9.4
Using school services	28.1	57.6	11.5	2.9	0
Finding forms	46	48.2	3.6	2.2	0
Finding contact information	37.4	53.2	6.5	2.2	0.7
Other	60.4	32.4	5	0.7	1.4

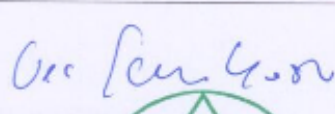
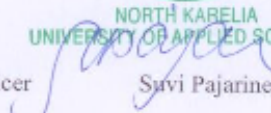

15. Are there any other activities that you use Pakki for?

- School regulations
- Study grants
- Writing my thesis and the graduation process
- Menus

16. How could Pakki be changed to suit your needs more? What would your dream virtual workspace portal be?

- Faster
- More reliable
- Better interface (cleaner, easier to understand and use; simple)
- Work better on different operating systems and on mobile devices
- Single sign in/no sign in for simple things (schedules, menus)
- Better email/communication system, possible integrated chat, also with the helpdesk
- More visible links/links that are relevant to me
- Ability to customize it for my own needs as my needs change through the studies/as projects change
- Better integration/interaction between the programs NKUAS uses
- Better calendar/schedule system; integrate room reservations somehow
- News and alerts about the school or subjects that are relevant to me (can I subscribe to someone's alerts, like a teacher being absent or a yoga class being cancelled?)
- Workspace available for remote/distance users also
- Improved search functions and information acquisition e.g. contact information, opening hours
- Sharing documents instead of sending many emails back and forth; somewhere to save, back up, and share my documents; possible group editing
- Team viewer/group work support
- Improved notification service instead of emails, too many emails
- Better feedback options

Research permission from North Karelia University of Applied Sciences

North Karelia University of Applied Sciences	
Final protocol of single authority Director of Degree Programme	24.1.2011 § 50 S
Matter and the clarification for it	Granting the permission for research "Developing a virtual workspace for NKUAS with Liferay technology".
Applicant/the person concerned	Kuittinen Bailey Suvantokatu 28 C 30 80100 Joensuu
Decision	Permission for the research is granted. The questionnaire <u>to the student</u> will be sent by Student Services. Please, send the questionnaire by email hilkka.korhonen@pkamk.fi The questionnaire <u>to the teachers and other staff</u> will be done by yourself. The email addresses will be sent to you with this decision. The results are allowed to be used only for the purposes of the research mentioned above.
Argumentation for the decision	
Basis of the decision	Guiding principles of North Karelia University of Applied Sciences 12§.
Public inspection	The decision shall be kept for public inspection in the office of North Karelia University of Applied Sciences in Tikkarinne 9 at the predetermined time 28.1.2011.
Signature	President of North Karelia University of Applied Sciences  Vesa Saarikoski
Notification	Notification of the decision given today by <input checked="" type="checkbox"/> Party 25 / 1 20 11 Study Affairs Officer  Savi Pajarinen  NORTH KARELIA UNIVERSITY OF APPLIED SCIENCES
Notification to the party	Further information of the decision Tel. +358 50 311 6276 <input checked="" type="checkbox"/> Information has been sent by e-mail (Municipal law 95 §) <input type="checkbox"/> Otherwise