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**DIGGING FOR DETAILS: THE PROSPECTIVE STUDENT'S JOURNEY TO
COURSE INFORMATION AT FINNISH UNIVERSITIES OF APPLIED SCIENCES**

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ABSTRACT

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This study examines the navigation of prospective international students on university websites, specifically focusing on the journey from the home page to curricular information. Employing the user interface evaluation methods of a cognitive walkthrough and heuristic analysis, the research examines the degree of difficulty in accessing curricular content and the design shift encountered in transitioning from the main websites to academic portals. The findings reveal that while university websites are often user-friendly and informative, the shift to academic portals can be disorienting, impacting students' perceptions and expectations. This study underscores the need for universities to adopt user-centric design strategies for their academic portals, thereby increasing their perceived value to the prospective student.

Keywords: cognitive walkthrough, curriculum, international degree programmes, international recruitment, prospective students, universities of applied sciences, usability, user interface heuristics, website navigation

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1 INTRODUCTION

Increased globalisation has led to a rise in student mobility (Arambewela 2010, 160). More and more students are looking overseas for their university educations, which raises the importance of the internationalisation of higher education. Adding to this, governmental mandates suggest that educational institutions triple the number of international students by as soon as 2030 (Ministry of Education and Culture 2021, 33-34; Lewin-Jones 2019, 11). The implementation and raising of tuition fees for some or all students has meant that universities are now having to ask the question of whether prospective students should be treated as customers (Vuori 2015, 590). Universities have thus found themselves at the centre of a debate around the marketisation of their educational services.

Critical analyses surrounding this shift are focused on integrity, trust, and education quality (Lewin-Jones 2019; Gibbs 2001; Acevedo 2011; Gibbs 2002). Some universities are beginning to ponder what aspects of theirs are “good for business.” The marketing terms *co-creation*, *customer experience*, and *value proposition* are words that have come to, in part, define higher education’s offerings and they reveal a shift towards the commodification of university offerings.

The university website serves as a curated showcase of institutional identity and priorities. It is a space of intentional design; each element of content is selectively presented to craft a narrative that aligns with the university’s strategic goals. The language employed is not neutral but persuasive, aiming to engage and convince prospective students of the institution’s merits. Studies on university recruitment webpages by Johanna Vuori (2015, 590) and others have noted that they often emphasise non-academic activities and campus life, allude to the broader experience of university life beyond the classroom. If an institution sees itself as a business—or more specifically as a profit generating entity—then analysing its services through the lens of marketing models seems an obvious choice for study. However, marketing and the university make strange bedfellows (Newman and Jahdi 2009, 9). If universities are to embrace a neoliberal perspective, then they should perhaps reflect on how they present themselves to a changing world with an eye towards integrity and trust.

Yet, the online representation of a university is not singular but multifaceted, especially from the vantage point of a prospective student seeking detailed academic information. Beyond the polished

veneer of the main site lies a more utilitarian space: the academic portal, where course and curriculum details reside. Studies of this divide are not to be found.

Despite a wealth of academic literature on the persuasive content on university pages, there exists a noticeable void regarding the availability of academic information on those sites. These studies on the content of university recruitment webpages collectively describe a sector that communicates in terms of aspirations and outcomes, often side-lining the core educational elements that form a substantive experience of higher education. It is within this context that this study positions itself, aiming to examine the nature of Finnish UAS websites, particularly how prospective students navigate the divide between promotional allure and academic substance.

The aim of this study is to examine the prospective student's digital journey, from initial interest to the pursuit of information about curricular content through the lens of user interface analysis methodologies. In doing so, this study raises questions about the interactive elements that guide the user on this journey. How accessible and available is such information? Where does curricular content reside within the university website's architecture? How does this journey contribute to the formation of potential students' expectations?

To address these questions, the study employs a range of user interface analysis techniques that explore the functionality of university websites. By examining the user interfaces of these websites, the research aims to uncover the nuances of navigation, the clarity of information presentation, and the overall ease with which prospective students can find curricular content. The insights gained from this analysis contribute to an understanding the intersection of design, technology, and education, and how they influence a prospective student's expectations through a university's digital presence.

2 THEORETICAL BACKGROUND

In the evolving landscape of higher education, the digital interfaces of universities have become a place where prospective students' first impressions and decisions are shaped. As the boundaries between educational institutions and the commercial realm increasingly blur, the need to critically examine how universities present themselves online becomes imperative.

This theoretical background delves into the intersection of student mobility, marketing communication, and curricular information. By integrating insights from user experience research and the critical discourse on higher education marketing, this section lays the foundation for understanding competing interests within UAS websites and their impact on prospective students' expectations.

2.1 The growth of international student recruitment

In contemporary economics, globalisation, bolstered by internationalisation, exerts a profound influence on various sectors, including higher education. A prevailing neoliberal economic ideology pushes universities towards commercialisation. As a result, universities of applied sciences (UASs) may be perceived principally as service providers, while less emphasis is placed on them as centres of academic growth. Prioritising degree acquisition over holistic development could potentially compel universities to market their courses as commodities in order to attract students as customers.

The European Education Area's "Study in Europe" initiatives exemplify efforts to enhance skill acquisition relevant to employment and entrepreneurship (The Council of the European Union 2021). The Organisation for Economic Co-operation and Development's (OECD) focus on equitable education access aligns with these goals, aiming to broaden the talent pool for high-skilled jobs (OECD 2017, 43). These goals place an emphasis on how universities create and structure the content on their international recruitment webpages, orienting them towards a vision of socio-economic gain.

Despite a decline in 2019-2021 due COVID-19, universities have seen a rise in international student enrolments over the past 35 years—0,8 million in 1975 to 3,3 million in 2015 (OECD 2017, 295.) This trend, and the increasing costs of recruitment, fuel the universities' need for alternative funding

sources (Foskett 2010, 34) which has resulted in government initiatives towards increasing international student numbers and increasing tuition fees (Ministry of Education and Culture 2021, 33-34; Lewin-Jones 2019, 11). These growth factors highlight the importance of internationalisation in education and extend to the need for an international approach in communication, both in the rhetoric and in the design of information, which students rely on to assess their educational options.

2.2 Information sources for international students

Prospective students navigate a complex map of information, guided by a diverse array of sources as they form their perceptions of studying abroad. A study international student recruitment by Suvi Jokila (2019, 13) states that national governments, institutions, and private actors all play influential roles in shaping student expectations and university choice. However, among the myriad of channels, university websites emerge as pivotal, with their content significantly impacting students' choices and expectations.

A study on the marketing of higher education by Gomes and Murphy (2003, 121) concludes that, historically, the majority of university-level students have utilised the internet as a primary tool in selecting overseas education, with institutional websites and email responses serving as critical determinants in their decision-making process. Furthermore, a UK study on the rhetoric of students' personal statements by Jane Hemsley-Brown (2012, 1016) determined that prospective students often rely on these online channels out of necessity; many prospective students, especially international applicants, may rely solely on digital interactions for insights into university offerings, as they may be unable to visit campuses or engage with faculty in person.

Prospective students' dependency on digital content highlights the importance of clear website information. According to a study by Gibbs and Dean (2015, 166) on prospective students' perceptions of importance and trust, the university website is highly correlated with prospective students' trust and is also an important factor in their choice of university. The trust that universities engender through these online experiences is a fundamental component of the prospective student's academic decision-making process, shaping both their immediate choice of university and also their overarching international study experience.

2.3 University websites as sources of information

University websites are not just digital brochures; they contain narratives crafted to convey potential and promise to prospective students. Vuori's (2015, 589) examination of International Business degree programme webpages reveals a pervasive theme: the pages are dominated by mentions of employability skills, employer involvement in curriculum development, and names of local business partners hinting at internships and collaborative projects. The content extends to highlight practical teaching methods and organisations primed for active business engagement, and invariably includes a list of lucrative, post-graduation career prospects (Vuori 2015, 589.)

A study by Adams and Eveland (2007, 73) comparing traditional and online universities found that online-only universities that do not have a physical location used images of buildings in their advertising as often as those universities with campuses. This implies is that some universities are might be fictionalising some elements to elevate their stature. This perhaps has the potential to erode trust in the marketing content of some universities' websites and students might, in such cases, look towards the curriculum for more concrete information.

Another study, by Bonnema and van der Waladt (2008), delves into the content of university marketing webpages and motivations of prospective students, and identifies elements such as employability, course content, student experiences, and sports opportunities. A study by Lewin-Jones (2019, 23) argues that such communications often marginalise the internationalisation of programs and the international student body itself, addressing students as consumers rather than as engaged participants in their education. While this study focused on South African universities, it raises awareness of what students are potentially looking for internationally.

Pernill Gerdien Antoinette van der Rijt's study (2023) offers a compelling framework for understanding how university websites construct their brand identities. Through what the study terms 'frames,' it asserts that universities frame their identities through internal characteristics, external position, student resources, and corporate citizenship (van der Rijt 2023, 206-07). However, the study's analysis predominantly pertains to the university's main website and the way courses are portrayed, hinting at a discrepancy between the marketing of university identity and the detailed academic offerings that are vital to prospective students. While other studies focus on messaging, particularly in the realm of branding, a detailed study of how curricula and course information are presented is lacking.

2.4 The importance of the curriculum in setting expectations

While it is not the focus of this study, the curriculum plays an important role in setting student expectations. Vuori (2015, 587) found that international programmes linked their curricula to future employment prospects featured on the universities' websites. Therefore, students who want to obtain the clearest picture of the content of their studies will likely navigate to the curriculum.

General definitions of the word *curriculum* include "the courses offered by an educational institution" (Merriam-Webster, 2023) and "the subjects studied in a school and what each subject includes" (University of Cambridge, 2023). From the student's perspective, however, the curriculum is contained on the webpage that lists all the courses for a given programme and allows further navigation to the individual course information.

In Finnish universities of applied sciences, the curriculum is not only a list of courses but a structured plan that outlines the entirety of a student's academic journey. As mandated by Finnish law, the curricula in these institutions are defined by several key parameters. These include the structure of the studies, including general and professional studies, electives, internships, and a thesis (Virkkula 2022; Finnish Government 2014). Additionally, it defines the level of studies, categorising them into levels 6-8 on a national scale, as outlined by the Finnish National Agency for Education (Virkkula 2022). Thus, the curriculum itself is grounded in mandated regulations and can serve as a beacon to a student's studies.

Having unencumbered access to course information seems to play an important role in setting student expectations. Of the five groups of prospective students identified in a study by Bonnema and Van der Waldt (2008, 325), three groups are found to prioritise a need for information about courses over other concerns. Despite this, the dominant discourse of internationalisation of university education tends towards international student marketing while attention to the communication of curricular content is absent. Additionally, as Auvinen et al. (2007, 11) point out, curricula in Finland have shifted away from being teacher-centred and have been reoriented towards a student-based approach. It is thus conceivable that students may use the curriculum as one way to align their expectations with those of their desired programme.

3 DATA AND METHODS

3.1 Universities of Applied Sciences in Finland

Twenty-one Finnish UAS websites (see Table 1) offering English bachelor's degree programmes were examined in this study. This list of UASs was obtained from the Ministry of Education and Culture's website (Ministry of Education and Culture 2023). One site from the Ministry's list was removed from this study as they had no Bachelor's degree programme in English in their catalogue. Two of the UASs on the Ministry's list had no international business degree programmes. For these two schools, a degree programme in health or adventure education was chosen as a substitute.

Table 1 A list of the UASs evaluated in this study

Arcada-ammattikorkeakoulu	Laurea ammattikorkeakoulu
Centria-ammattikorkeakoulu	Metropolia ammattikorkeakoulu
Diakonia-ammattikorkeakoulu	Novia-ammattikorkeakoulu
Humak ammattikorkeakoulu	Oulun ammattikorkeakoulu
Häme ammattikorkeakoulu	Tampereen ammattikorkeakoulu
Jyväskylä ammattikorkeakoulu	Satakunta ammattikorkeakoulu
Kajaanin ammattikorkeakoulu	Savonia-ammattikorkeakoulu
Karelia-ammattikorkeakoulu	Seinäjoen ammattikorkeakoulu
Kaakkois-Suomen ammattikorkeakoulu	Turku ammattikorkeakoulu
LAB-ammattikorkeakoulu	Vaasan ammattikorkeakoulu
Lapin ammattikorkeakoulu	

3.2 Data collection and scope

Screen captures at 1280 pixels wide by approximately 1600 pixels tall were taken of every click and scroll action used to navigate from the English home page of each UAS to the curriculum for the international business degree during the Autumn of 2023. Transition links (those links that fa-

cilitated the transition from the main website to the academic portal) were isolated and coded. Finally, a heuristic evaluation was performed between the website pages and the academic portal pages to identify design and functional inconsistencies.

This study utilizes usability evaluation methods, focusing primarily on a cognitive walkthrough (explained in section 3.4) and a set of heuristic usability principles (explained in section 3.5). The combined use of these methods seeks to analyse the experience of prospective international students as they navigate to curricular information on UAS websites. In applying these evaluation techniques, the study adopts the viewpoint of a hypothetical user, assessing web page content not through a business lens, but from the perspective of an individual with their own unique viewpoints.

3.3 The user interface and its contribution to engagement

The user interface (UI) is defined by author Aaron Marcus (2002, 24) as “a computer-mediated means to facilitate communication” but more importantly, Marcus goes on to illustrate that the communicative nature of UI is vital and perhaps more important than any physical representation such as buttons, menus, waypoints and so on. The UI can thus be seen as performing a vital role as the university’s voice in mediating a prospective student’s perceptions and expectations.

Therefore, a website’s user-interface components carry meaning. The semiotic nature of the user interface can contribute or detract from a prospective student’s understanding along their journey. Jakob Nielsen and Robert Mack (1994, 29), established experts in the field of usability, posit that a system should use words and terminology that are familiar to the user. Users shouldn’t have to worry about whether labels and actions have different meanings and functions as they navigate within or across university websites and academic portals. When users can interact with a system seamlessly, they are more likely to stay focused (Eysenck 1982 as cited in Burton-Jones and Grange 2013).

By attending to these details in the user interface of a university’s website, a university can potentially increase user engagement and more clearly set the expectations of prospective students to ensure that both the student and the university are well matched to each other. This study identifies specific inconsistencies during the prospective student’s journey to curricular content by observing the user interface throughout the process.

3.4 The cognitive walkthrough method

The cognitive walkthrough method, as formulated by Cathleen Wharton, John Rieman, Lewis Clayton and Peter Polson (1994) and streamlined by Rick Spencer (2000), serves as a tool in user experience research to simulate new users' interactions with a system. It is a structured method that evaluates an interface's usability through a series of specific questions asked at each decision point. These questions probe whether users can intuitively navigate the system, recognise and understand actions and outcomes, and perceive progress toward task completion.

The design of a cognitive walkthrough evaluation starts by identifying a user need. User needs can be discovered through a method known as *user needs analysis* (Wilson 2010, 23). This analysis involves research into discovering who the audience is, what their priorities are, identifying business objectives, and documentation (Wilson 2010, 31). This study aims to identify the audience as a prospective student whose priority is to find factual course information about the courses in the International Business degree programme at different Finnish UASs. This prospective student will be referred to as 'user' and 'prospective student' interchangeably throughout the remainder of this paper.

This cognitive walkthrough begins with the user knowing the name of the English degree programme to which they wish to apply and that it contains words like "international" and "business." The user also knows that they are looking into bachelor's programmes. The user's goal is to get to course information as efficiently as possible. They have already narrowed down the UASs that they want to attend, and they wish to compare course details in each of the degrees.

It is likely that the user will have bookmarked the programs in which they are interested, and their primary focus will be on moving from the programme page to the curriculum. However, the journey to the programme page will be considered briefly in the analysis for the sake of understanding the full journey from the English home page of the university to the curricular content for that programme.

In a cognitive walkthrough, four questions are asked at each stage of the walkthrough (Wharton et al. 1994, 112). Spencer (2000) refined those questions to two. This study's walkthrough has added an element of findability into the questions to measure the difficulties that could be encountered in locating navigational elements. Findability is a heuristic measure that incorporates the need for the

user to scroll, distractions from surrounding signals, and the prominence of the required navigational link.

Modified questions from the cognitive walkthrough model will be used for our analysis:

1. Will the user be able to find the appropriate link efficiently?
2. Will the user associate the correct action with the effect that the user is trying to achieve?

The walkthrough (see Table 2) that will be used in this study consists of the following:

Table 2 UAS website cognitive walkthrough steps

Task	Considerations
Look for a link to the English Bachelor's degree programmes and access that page.	This may take several steps, as links to the bachelor's degree programmes may not be available directly from the home page of the UAS.
Look for a link to an English International Business Degree programme (of any variety) and access that page.	This may be available from the main navigation from the start. However, it is likely that the user will have to think more generally than a specific programme to start.
Look for a link to the curriculum for that programme and access that.	It is important that curricular content the user finds is in English.

In applying this cognitive walkthrough to the Finnish UAS websites, the method will illuminate the journey of international students as they seek academic information. Starting from the main page and moving to the study guide for degree programme details, the walkthrough will identify design elements that may hinder information discovery and examine the transition between promotional and academic content.

3.5 The heuristic evaluation method

Heuristic evaluation is a *discount* usability method used by usability practitioners to evaluate the usability of a product through a set of well-established but somewhat vaguely defined conventions. Discount usability methods are low-cost, high-return methods used by usability practitioners to identify issues (Nielsen and Mack, 1994, 25). Heuristic methods involve a team of evaluators using

a product—such as a website—to measure its compliance with recognised standards of usability principles (Nielsen and Mack 1994, 26). These principles have evolved alongside the evolution of user interfaces to include websites, devices, and physical spaces.

3.5.1 The efficacy of heuristic evaluations

As with any method, it is considered diligent to examine the method's effectiveness in understanding the subject under study. These methods have been scrutinized thoroughly in academic circles. Heuristic analysis discovers, on average, 60% of the problems discovered over the course of a product's development. (Tan, Liu, and Bishu 2009, 89; Agarwal and Venkatesh 2002, 104; Bailey, Allan, and Raiello 1992; Fung et al. 2016, 744; Khajouei, Hajesmaeel Gohari, and Mirzaee 2018, 88). Nielsen and Mack (1994, 32) found in one study a benefit-cost ratio of 48. Though the calculations used to support the efficacy of heuristics have been questioned (Gray and Salzman 1998, 222-223), its validity and effectiveness is well supported in web analysis when using the techniques to evaluate websites against a defined set of standards (Nuñez, Moquillaza & Paz 2019).

3.5.2 Heuristic usability principles

The principles that are used to heuristically measure the usability of websites are varied based on the purpose of a product and have evolved as technology and users have done. Initially, before the web was popularised, Nielsen and Mack (1994, 30) proposed a set of ten usability heuristic principles that evaluators could use to assess a product's usability (see Table 3). When internet shopping became part of people's lives, Sirkka Järvenpää and Peter Todd (1996, 71-75) created a list of heuristics appropriate to a user's shopping experience. As internet speeds began to increase, Jonathan Palmer (2002) incorporated content and web responsiveness into a set of heuristic principles with which sites could be evaluated. The number of technology experts increased, and Burton-Jones and Grange (2013) refined these lists to measure the gap between use and effective use. Finally, Nizamani et al. (2022) suggested that websites which target a particular culture or user segment require culture and domain-specific heuristics to be effective. This study did not investigate the influence of culture on UI; however, it should be addressed in future research.

3.5.3 Heuristic usability principles used in this study

Nielsen and Mack's (1994, 30) usability heuristics (Table 3) as they relate to this study are described in the following paragraphs. Note that this study does not evaluate the heuristic principles of "error prevention", "help and documentation" or "help users recognise, diagnose, and recover from errors" as the cognitive walkthrough process revealed no errors and included no help inquiries.

Table 3 Ten usability heuristics by Nielsen and Mack (1994, 30)

Visibility of system status	Recognition rather than recall
Match between system and real world	Flexibility and efficiency of use
User control and freedom	Aesthetic and minimalist design
Consistency and standards	Help users recognise, diagnose, and recover
Error prevention	from errors
Help and documentation	

Visibility of system status: questions how websites display the user's progress towards the curriculum and how the user's current location within the architecture of the sites is indicated. Typically, these signs might include breadcrumbs or a similarity between the link clicked and the resulting page title.

Match between system and real world: questions whether the language or signs used are familiar to the user's conceptual model and that there is a natural order to things presented on screen. Elements that affect this negatively are unfamiliar place names, codes that are meant to uniquely identify system components, the use of non-English words and terminology that is complex or confusing.

User control and freedom: questions whether users can return to a previous state (or page) easily. Typically, this will be available through the web browser's *back* button. This study looks specifically at the user's ability to return to the university's main website from the academic portal.

Consistency and standards: questions whether different interactive elements have the same function or the same interactive elements have different functions. This principle evaluates inconsistencies in the location of interactive elements, design of such elements and the use of adornments.

This is examined within each university's website, as a comparison of the university's main website and the academic portal, as well as across different universities' websites that the prospective student might be evaluating.

Recognition rather than recall: questions whether the interactive elements mirror what is in the user's goal or whether the site requires the user to remember elements from previous steps. This typically combines with *real world matching* and *consistency and standards* with the addition of screen artifacts that serve as reminders. In our user's walkthrough, having to remember the name of a particular degree negatively impacts this heuristic principle.

Flexibility and efficiency of use: questions the ability of the prospective student to increase their efficiency as they navigate to the curricula of an increasing number of university websites. Allowing direct access to the curriculum from the programme information page positively impacts this heuristic.

Aesthetic and minimalist design: describes the cognitive load required to identify relevant information amidst irrelevant information. Negative impacts on this are visual complexity surrounding relevant navigation links and excessive scrolling required to access required navigation links.

It should be recognized that the age of these heuristic principles—established three decades ago—does not diminish their validity. With the evolution of the internet towards conventional practices, UI and UX designers have grown more accustomed to these guidelines, making deviations from these established principles increasingly rare.

This study has adapted Nielsen's heuristics to accommodate the user's cognitive workflow. This study is guided by two overarching values. Firstly, navigability and organisation and greater amounts of information and content are associated with more successful websites (Palmer 2002, 155, 164). Secondly, site design and usability are closely associated with site success (Palmer 2002, 163). Therefore, design of information, particularly when that information is complex, is key and will be assessed.

4 FINDINGS

These findings describe the actions that a prospective student might take in the cognitive walkthrough to efficiently arrive at the curriculum page for the degree programme. This study will look at heuristic principle violations and the labelling of transition links, and provide an overall impression that a user might have in this process.

4.1 Definitions of key terms

University website: This refers to the primary website of the university, which usually provides general information about the institution. The main website typically includes information about the university's history, mission, administration, admissions, news, and general contact information. In addition, the main website also offers a selection of programmes that the university offers. It is from these individual program pages that users will find a transition link that will open the academic portal.

Academic portal: When a user navigates to view curriculum or course information, they are often directed to a specialized section of the website or a separate system altogether. This part is typically more dynamic and database-driven, offering detailed and regularly updated information about courses, schedules, academic programs, and sometimes even interactive elements like course registration or e-learning modules. At Finnish UASs, the URL for this site almost ubiquitously includes “opinto-opas”.

Transition link: This is a link that facilitates the transition from university website to the academic portal. Its adornments and wording emphasise the role of the link in transitioning the user from the university website to the academic portal.

Main navigation bar: This refers to the shared navigational menu near the top of all screens in the university's main website and often at other locations in the academic portal. The main navigation bar serves as a roadmap to the primary sections and pages of the website or portal. The main

navigation bar typically has prominent and consistent placement, clear labels, and an intuitive organisation. Departures from these heuristics, most notably in the academic portal, are noted in the findings.

4.2 Commonalities found across UAS websites

Commonalities were found across all the university main websites studied. Consistencies in the skeleton planes, defined by Garrett (2011, 108) as page layout, were observed. A header area at the top of the page and a hero image placed beneath it was a common skeleton structure.

All of them contained a navigation bar, some of them menus, in the header area of the website. All of them contained the university logo in the left or right corner. They all contained a language selector near the top of the layout as well. This falls in line with a general understanding that many websites are designed with conventional layouts, with designers often using templates.

The navigation bar itself was moderately consistent across all the websites, though some differences are worthy of note. Most of the universities had, as their first point of navigation, an item called “Studies” or “Academics.” One university had prioritised “News” as their first item in the main navigation bar, relegating “Studies” to a second position. Other items common to these navigation bars allow existing students and staff to access pages that are of interest to them.

Another trait that all of the UAS websites shared was that they were multifaceted; this study has identified two of those facets: the *university’s main website* and the *academic portal*. It is these facets that this study concerns itself with and, in particular, the user’s perceptions as they move from one facet to the other.

While the prospective student may take many paths, when those users wish to view the curriculum they must navigate to the academic portal. In all but two sites analysed, the transition from the university’s main website to the academic portal was profound and revealed overall inconsistencies between the two sites. The main navigation, present on all the universities’ main website pages was removed or replaced when this link was clicked, fonts and colours were often changed, an overall sense of familiarity was lost, and the user had to orient themselves to a skeleton due to this abrupt change.

4.3 The first click

For the purposes of this cognitive walkthrough, this study identified the main navigation bar in the header area of each webpage as a starting point for the user journey to the curriculum. Two of the universities' navigation bars were represented only as a *triple-bar icon*, also referred to as a *hamburger menu icon* (see Figure 1). The triple-bar icon does not display options for the user — it removes visibility of the options until it is clicked. This violates the heuristic of visibility of system status. The triple-bar icon must also be clicked each time the menu needs to be accessed and thus violates the heuristic of efficiency (Burton-Jones and Grange 2013, 644). In one case, the main navigation bar overlaid images, making the hamburger menu far less distinct than other signs on the page.



Figure 1 A triple-bar icon, also known as a hamburger icon.

The initial signs that the user must understand in order to navigate to the curriculum were inconsistent across the websites analysed. These differences are shown in Figure 2.

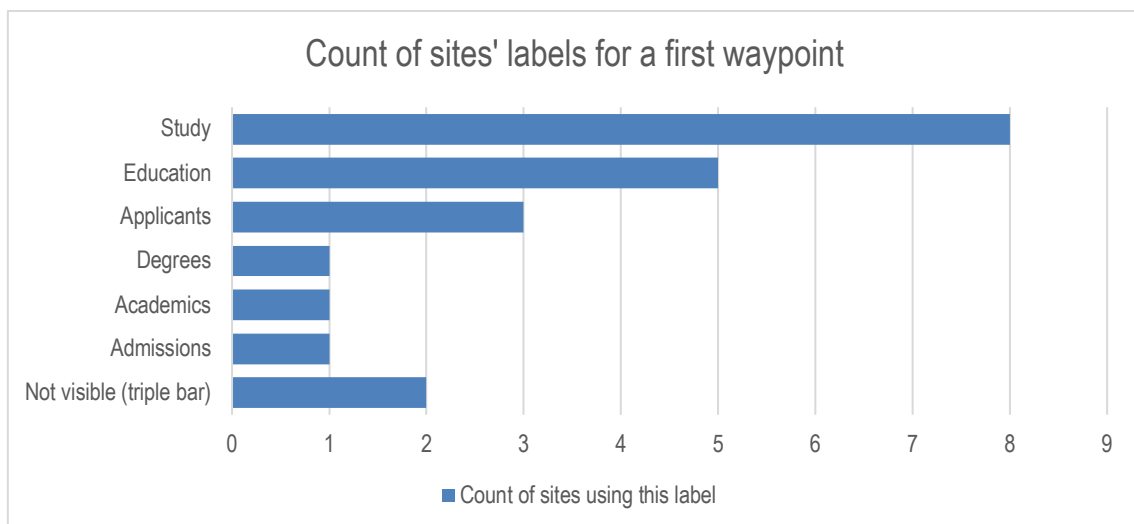


Figure 2 The label displayed for first click on the walkthrough.

4.4 Navigating through the university's main website

From the first click to the transition link pointing to the academic portal, this analysis found between two and five links would have to be located, identified and clicked. Both sites with triple-bar menus required two clicks: a click to reveal and an additional click to open a sub-menu. Sixteen of the analysed sites required scrolling at least once to follow a path to the proper link. This means that the links were not visible upon arriving at the screen. There were visual inconsistencies for the links used to navigate to the transition link within all of the sites analysed. This is a result of the design of the webpages differing over the journey of the user. These variances were not always extreme. The number of user actions (clicks) required to navigate to the curriculum varied between three and six. Most sites required five clicks while the fewest sites required three. It is of note that only one website (S01) analysed offered a direct link to the academic portal from the home page of the university's main site.

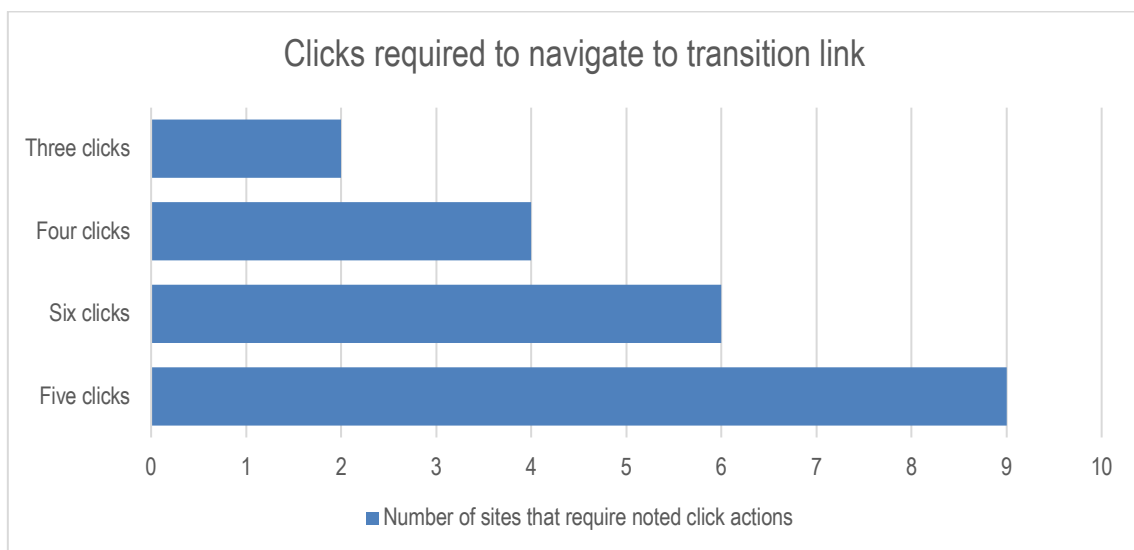


Figure 3 Number of clicks required to navigate to transition link.

Each step (the number of which is shown in Figure 3) of the cognitive walkthrough, defined as a “locate and click” action (question 1 of the cognitive walkthrough), was assessed against the heuristic usability principles and the results recorded (as shown in Figure 4). The violations found are noted as follows. *Aesthetic and minimalist design* indicates that there was significant complexity in the visuals or that there were several competing signs along the path. *Flexibility and ease of use* indicates that there was significant scrolling required. *Visibility of system status* indicates that pages were not named for the link or that location was either not indicated or hidden. *Match between*

system and real world indicates that the site used terminology for a link that is unique amongst the evaluated sites or is generally confusing.

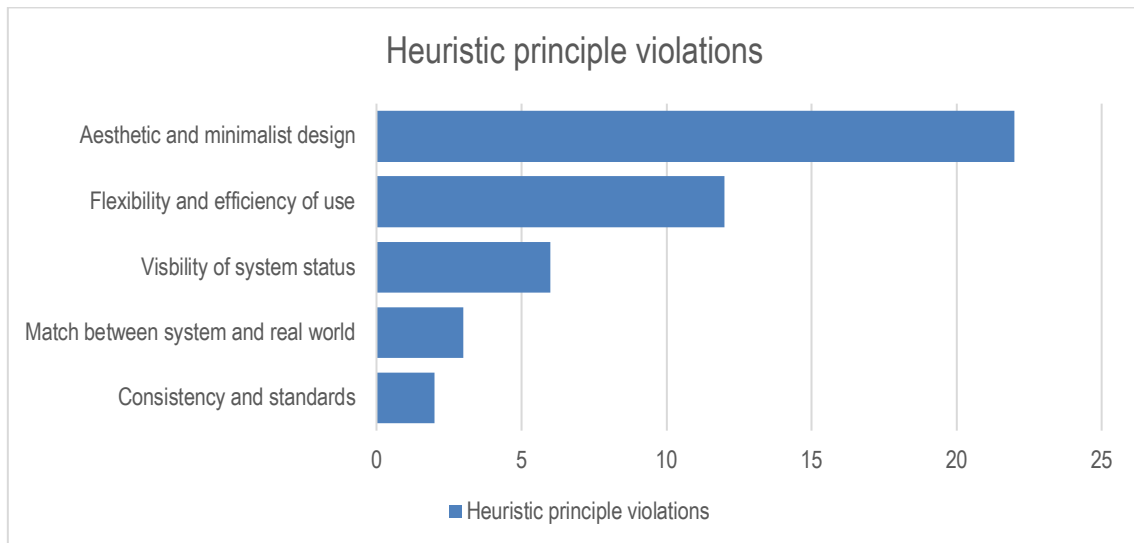


Figure 4 Heuristic principle violations in walkthrough to transition link.

4.5 The transition link

The link that opens the academic portal is referred to as a *transition link*. The transition link varied both visually and textually across sites. Some of these links were framed, giving them a clickable button-like appearance. Some had arrows pointing to the right. Some had an escape icon. Some used colour as an adornment, indicating their click-ability. Some links were displayed inline within a related sentence or paragraph. Some were underlined. Most had a combination of adornments, see Table 4.

Adornments seen in the transition link include a *frame* around the clickable link. This could be a simple box, a filled box, or a box with rounded corners. A frame might imply that the link is a button that is meant to be clicked. Adornments also include an *arrow*; invariably was an arrowhead pointing left, sometimes with a shaft. An *escape icon* is a square with an arrow pointing up and to the right and was used as an icon next to the label on a few sites. *Font colour* can differentiate link text from other, non-interactive text. *Inline* links reduce visibility by placing the link in a body of unlinked text. Finally, *underlining* indicates that the link itself is underlined while surrounding, unlinked text is not.

Table 4 Transition link labels and adornments

Label for transition link	Frame	Arrow	Escape Icon	Font colour	Inline	Under- line
Study Guide	Yes	Yes				
Read more about curricula	Yes	Yes				Yes
Curriculum			Yes			Yes
curriculum				Yes		Yes
See the full curriculum in Study Guide	Yes		Yes			
EBA Curriculum				Yes		Yes
Curriculum	Yes	Yes				
curriculum					Yes	Yes
Study Guide	Yes	Yes				
Curriculum	Yes					
KAMK Study Guide				Yes	Yes	
Curriculum, effective from Autumn semester 2023				Yes	Yes	
See courses and the programme structure	Yes		Yes			
Explore the curriculum		Yes		Yes		
Curricula	Yes	Yes				
See the full curriculum		Yes				
International Business Curricula		Yes				
Curriculum for International Busi- ness Study Guide	Yes	Yes				
Arcada's digital study guide Start			Yes		Yes	Yes
Read more	Yes					

4.5.1 Placement and clarity of the transition link

A key observation from the study pertains to the placement and clarity of the transition link leading to the academic portal on the various university websites. Notably, in eleven of the analysed websites, reaching the curriculum link required the user to scroll the webpage. This scrolling often involved navigating past an array of competing signs and links, which would have led to different sections of the university's main website.

A particularly intricate example was observed on two websites where the curriculum link was hidden within an expanding accordion frame. On these pages, ten such frames were present, each offering potential paths, yet two appeared relevant to curriculum content: 'Content of Studies' and 'Programme Structure'. The essential transition link was eventually located under 'Programme Structure'.

Moreover, a trend of an increasing quantity of text on most websites as the user progresses closer to the curriculum was observed. This phenomenon was largely attributed to the pages displaying detailed program information.

4.5.2 Wording of the transition link

As the user progressed through the website, they navigated through several webpages. Each of these webpages required that the user locate and interact with, by clicking, a link that brought the user to the next stage of their journey to the curriculum. The final link that the user clicked before they entered the academic portal indicated that they were about to potentially arrive at the curriculum. The inconsistencies in the transition link's label are shown in Figure 5.

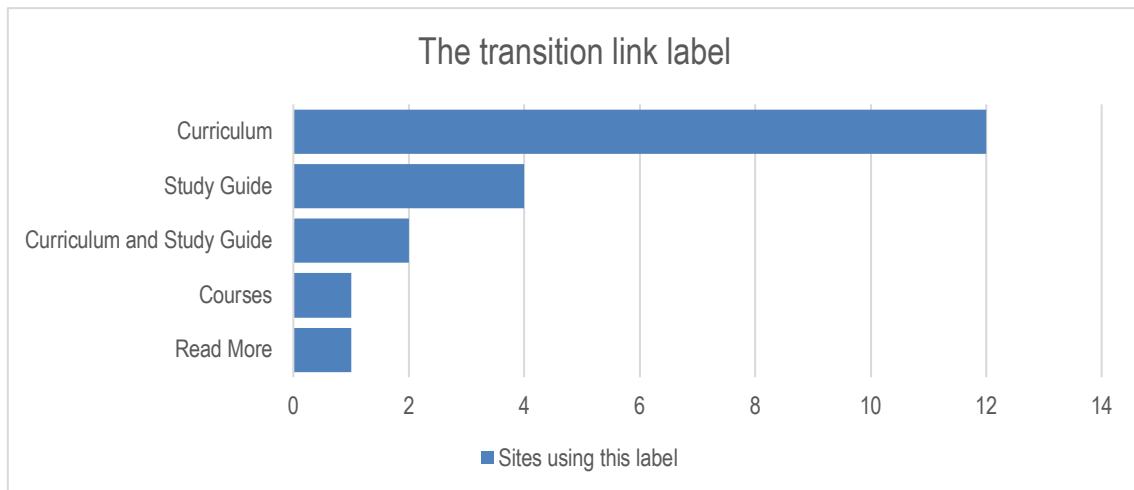


Figure 5 Labels used for the transition link

4.6 Arriving at the academic portal

During the pivotal moment in the user journey, when transitioning from the university's main website to the academic portal, a distinct shift occurred in the user's experience. This transition point was marked by a noticeable change in the webpage's design and layout, diverging considerably from the aesthetic and structure of the preceding pages. A key element of this shift was the modification or complete removal of the main navigation bar, a factor that could significantly alter the user's sense of continuity and orientation. Upon this transition, an intriguing finding emerged: only in seven out of the twenty-one sites analysed did the user directly land on the curriculum page after clicking the transition link. Moreover, of these seven, only three presented the curriculum in English. Consequently, this necessitated additional navigational steps for users on eighteen of the twenty-one sites to access the complete curriculum in a language comprehensible to them.

4.6.1 After clicking the transition link

The journey to the intended curriculum page was often not as straightforward as one might anticipate. In the majority of the websites, all except for seven, the initial page presented to the user post-transition was not the actual curriculum they sought. While in three instances the user's task was somewhat simplified by merely requiring a language change to English, the remaining cases presented a more complex scenario. The user was compelled to engage further with the academic portal, navigating through its layers to locate the specific curriculum of interest.

4.6.2 Visual and functional consistencies and inconsistencies

In every UAS website examined, the main navigation was what tied the university's main website together. This navigation was lost when the user arrived on the academic portal page (see Appendix 1). In a few cases, some of the functionality, such as language choice, was carried over. However, the visual interface for controlling the language differed between the main website and the academic portal.

The main navigation found at the university's website was, with only two exceptions, horizontally oriented and placed near the top of the webpage in the header area. Eighteen of the academic portals analysed had their navigation positioned vertically along the left side of the screen. This navigation often used terms that prospective students may not be familiar with, and those terms did not mirror the ones used in the university's main website. This results in users having to consider their new environment at length, adding to their cognitive load.

Only one site offered a main navigation bar in the academic portal that mirrored, to some extent, the one found in the university's main website. On this site, the visual elements and the items in the menu had changed but the navigation bar itself appeared in the same location in both the university's main website and the academic portal. Also, on this site, colours and visual cues were reflected in both the main website and the academic portal adding cohesion to the pairing.

The ability to change the language of the academic portal appeared across all of the examined academic portals. However, the representation of this functionality was inconsistent. In some cases no indication was given as to which language was currently selected. In cases where some indication was given, the indication pointed to the incorrect language. In many cases, the wording of the language selection changed: FI/EN to Suomi/In English. These inconsistencies were small. However, they contributed to an overall sense of divide between the university's main website and the academic portal, potentially adding to a user's cognitive load.

4.6.3 Navigating to the curriculum

If the user did not arrive to the curriculum directly, that navigation was recorded, and the cognitive walkthrough continued with the same questions. The difficulties the user faced in the academic

portals, however, differed from those faced in the universities' main websites. Firstly, the number of clicks required to get the curriculum varied between zero and seven, with most sites requiring a single click to get to the English curriculum once arriving at the academic portal. Often this was merely the user having to select a language. In extreme cases, after the user had selected a language, they had to begin the process of locating the curriculum anew using the academic portal's navigation (our seven click example). See Figure 6 for a chart showing how many academic portals required zero to seven clicks to reach the curriculum.

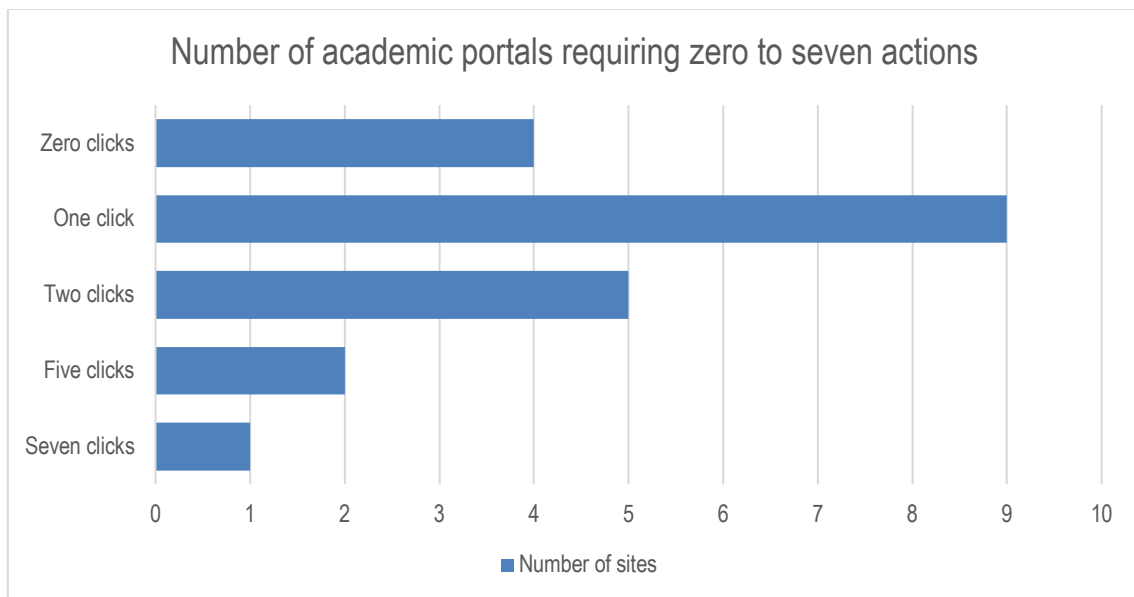


Figure 6 The number of academic portals requiring zero to seven clicks to reach the curriculum.

The issues found in navigating to the curriculum (Figure 7) also varied from the university's main website.

- **Select Programme and Language:** Users had to re-select the programme and/or language within the academic portal, despite having already made these selections on the main website. This redundancy violates the *efficiency* heuristic principle.
- **Decoded Codes:** When selecting a programme, class codes were displayed alongside programme names. While this partially violates the *match between system and real world* heuristic, the inclusion of programme names somewhat reduced cognitive load for the user.
- **Programme Codes:** Instances where only programme codes were displayed, with no accompanying names. This directly violates the *match between system and real world* heuristic, as it likely does not match the user's conceptual model.

- **Unfamiliar Terms:** The use of terminology likely unfamiliar to the user. This practice contravenes the *match between system and real world* heuristic, potentially confusing international students.
- **Unfamiliar Location Names:** The inclusion of campus names that international users may not recognise. This also violates the *match between system and real world* heuristic due to its local-centric approach, with which an international prospective student will be unfamiliar.
- **Navigation Complexity:** Situations where users needed to make more than four selections to access the desired curriculum. This complexity violates the *efficiency*, *minimalist*, and *real world* heuristics.
- **Conflicting Choices:** Navigation options were unclear, with more than one choice seemingly leading to the desired curriculum. This ambiguity infringes upon the *efficiency* and *minimalist* heuristics.
- **Hidden Options:** Curriculum access choices were concealed within a hierarchical structure that needed to be expanded, violating the *efficiency* and *recall* heuristics due to their obscured nature.

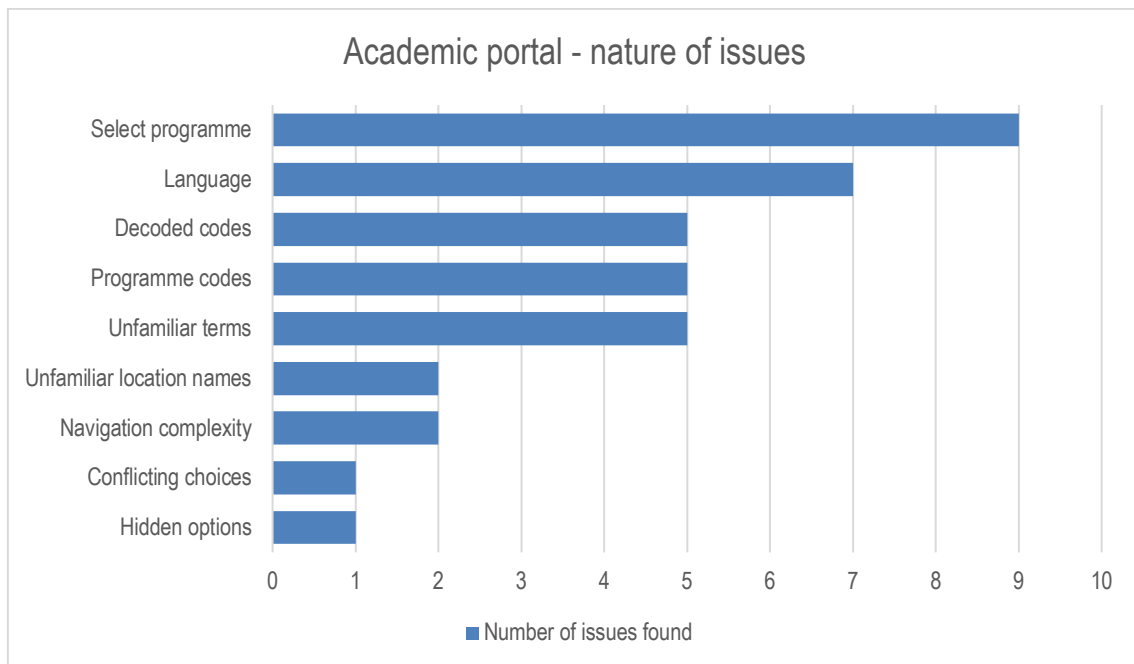


Figure 7 The nature of the issues found in the academic portals.

4.6.4 Navigation back to the main site

While not a step in our user's journey, navigation back to the main site was evaluated. Sixteen of the study guides offered navigation back to the university's main site; however, only five of those returned the user to the English webpage. Another five of the evaluated sites did not offer navigation back to the university's main website at all. Particularly notable was that these five sites displayed the university logo on the academic portal pages but clicking that logo did not bring the user to the university's main website.

5 CONCLUSIONS AND BUSINESS IMPLICATIONS

The aim of this study was stated to examine the prospective student's digital journey, from initial interest to the pursuit of information about curricular content through the lens of user interface methodologies. These conclusions begin by reiterating the questions that were asked at the outset of this study.

5.1 How accessible and available is curricular content?

Prospective students comparing curricula benefit from the consistently placed main navigation menus across university main websites. Adhering to Nielsen and Mack's (1994) principle of consistency and standards, the horizontal navigation menu is typically found in the header of web pages and enhances ease of navigation. The common practice among universities to position degree program links in the leftmost menu further contributes to this uniformity, thereby improving efficiency of use as students navigate multiple UAS websites. Moreover, the uniform approach to navigating programme pages across these websites reinforces this ease of access. These uniformities, excepting specific usability testing outcomes, indicate that the main websites of the universities, in general, exhibit no significant usability heuristic issues.

The use of a hamburger menu on two of the analysed sites obscures main navigation functionality, however, demanding two additional clicks and thereby reducing user efficiency. These sites diverge from the typical horizontal menu bar format, creating an inconsistency within Finnish UAS websites.

The visibility of the transition link varies significantly across the UAS main websites. The inconsistent naming, positioning, and clarity of these links suggest that users may require more time to locate the transition link compared to other navigational elements. While usability testing could provide further verification, the principles of consistency, minimalist design, and efficiency (Nielsen and Mack 1994) already hint at the potential for user confusion in this area.

Additionally, the labelling of the transition link shows considerable variation, with terms like "study guide" and "curriculum" used interchangeably, yet their meanings are not synonymous. Aligning with Nielsen and Mack's (1994) principle of matching system and real-world heuristics, universities

are advised to align their terminology with international students' expectations. Students' expectations of what constitutes a 'study guide' may vary greatly among students; for some, a study guide might represent a list of classes, while for others, it could include essential information like visa application procedures, housing options, and local amenities. Understanding these expectations is critical for universities aiming to provide clear, effective guidance to potential international students.

5.2 Where does curricular content reside within the university website's architecture?

This study extends beyond previous research (Vuori 2015; Adams and Eveland 2007; Bonnema and Van der Waldt 2008; Lewin-Jones 2019; van der Rijt), which focused on the content of university's main websites, to explore a secondary system often encountered by prospective students: the academic portal. It was found that the transition between the university's main website and the academic portal is not always immediately apparent, becoming clearer only after users have visited multiple UAS websites.

The curricula within UAS websites predominantly reside in academic portals, distinguishable by URLs containing "opinto-opas" or "study guide". This distinction signifies a departure from the university's main website, marked by significant visual and functional changes. The shift from a brochure-like, user-friendly main website to the more factual and complex academic portal represents a stark contrast, often resulting in a jarring user experience. These portals, governed by enterprise systems, share a similar look and feel, yet from a user's perspective, they represent a transition into a seemingly more intricate and less navigable environment. This change, often violating Nielsen's (1990) heuristics (see Table 3), suggests a deliberate design choice, prioritising promotional over curricular content.

This study also identified a variation in the labelling of the transition link, with terms like "study guide" and "curriculum" used inconsistently across different sites. Such disparities can potentially increase cognitive load for users comparing different universities, as the meanings and implications of these labels are not equivalent.

Furthermore, the journey from the main website to the academic portal varied in length and complexity. The shortest journey involved as few as five user actions, while the longest required fifteen. This disparity highlights potential areas for improvement in user experience.

5.3 How do these factors shape student expectations?

Prospective students who experience complicated user interfaces when getting curriculum information may form an expectation that the systems at that university are equally complicated. Worse yet, they may dismiss such websites as being unusable and not consider the university at all. As Palmer (2002, 158), Agarwal & Venkatesh (2002, 168) and Klein iterate the design of a website is correlated with increased user satisfaction and likelihood of return. Furthermore, as Klein (1998, 201) states, focusing on the medium may be as critical as traditional methods of focusing on product and segmentation. As such, this study sheds light on what appears to be a part of the journey that is predominantly unkept. A student who sees the disarray may form negative expectations based on this and thus be inclined to not return.

Overall, these findings emphasise the need for universities to streamline the navigational journey through their academic portals, aligning user experience with the principles of flexibility, efficiency, and consistency (Nielsen and Mack 1994, 30). Enhancing usability in this aspect can significantly impact prospective students' perceptions and decision-making, reinforcing the importance of thoughtful and user-friendly web design in higher education.

5.4 Further conclusions

Much that has been said in academic literature about university website content has focused on the university's main website and the marketing content that it contains (Vuori 2015; Adams and Eveland 2007; Bonnema and Van der Walldt 2008). The importance of curricular information in forming student perceptions and setting student expectations has also been noted (Jokila 2019; Gomes and Murphy 2003; Gibbs and Dean 2015). The juxtaposition of marketing rhetoric and academic information is where this study has found many visual and functional dissimilarities.

It is apparent that the majority—eighteen out of twenty-one—of the examined universities rely on enterprise software to drive the user interface of their academic portals. In contrast, three websites have endeavoured to align their study guides with their own university website's standards and only one shared significant navigational, visual, and functional characteristics between the university website and the academic portal.

The way in which information and links on the curriculum pages are presented significantly affects the user experience, with more inviting designs potentially facilitating better engagement. However, care must be taken. Sites that attempt to impose a style onto their curricular pages run the risk of their differences to other universities causing the user confusion. The sites that follow a design standard incongruent with their university's main website may be more usable by the user who has acclimated to these incongruities.

Universities that wish to forge their own path with uniqueness in their designs would benefit greatly from evaluating them using usability principles and other usability testing techniques. Doing so effectively promotes user engagement. Gerhardt-Powals (1996, 210) suggested this correlation nearly 30 years ago and these principles remain relevant to this day. Ensuring that a website's uniqueness benefits users in ways that help them satisfy their needs can not only differentiate a university, but also do so in a way that adds to a university's perceived value.

The findings also highlight a need for improved usability in the navigation to and around curricula. Effectively communicating complex information does not necessitate a complex presentation. Simplifying this process can enhance the university's value proposition, as effective communication is integral to both integrity and excellence in academia. It is essential to develop design strategies that can articulate complexity without overwhelming the user. Simply storing the user's language and programme in a cookie that can be used to determine the language and programme of the curriculum is a tactical move towards one such strategy.

This study concludes that while elevating the curriculum's position in the website's navigational hierarchy might seem beneficial, it is not advisable until the design of the curriculum itself is addressed. Recommendations for improvement include harmonising functional elements across both the main website and academic portals and ensuring consistency in look, feel, and functionality. This includes the uniform application of colour schemes, logos, adornments, and other design elements. The goal is to render these informational elements not only aesthetically aligned with the website but also accessible, legible, and useful for prospective students seeking to make informed decisions based on factual data.

In cases where the degree programme pages do not have a curriculum ready for the upcoming enrolment period, indicating this in some way either before the transition link is clicked or when the

user arrives at the curriculum page is advisable. Improving the navigation across multiple years of curricula could be a tangential development project if a UI combined these two goals.

5.5 Conclusions summary

The ability to communicate knowledge and information are among the fundamental values of higher education. Rodney Arambewela (2010, 155) cited Richard Oliver and Wayne DeSarbo (1988) when characterising a student's expectations as "post-choice evaluative". Very little of the expectation-setting information that students receive is grounded, unchanging, free of misinterpretation and non-volatile (Arambewela 2010, 155). In this way curricula serve a dual purpose in both setting of expectations and evaluating progress within the programme. It serves as a vital tool both before a student arrives and during a student's presence at the university.

According to Arambewela (2010, 155), much of the information that shapes students' expectations is subject to change, open to misinterpretation, and often unstable. In this context, curricula play a dual role: they not only set expectations for prospective students but also serve as benchmarks for assessing progress within the program. Thus, curricula are essential tools, valuable both prior to a student's arrival and throughout their tenure at the university.

Refining the user interface for degree program information is not just an aesthetic enhancement but a strategic investment. It plays a crucial role in fostering trust among potential students.

While a considerable volume of research in higher education consumer choice focuses on themes such as internationalization, student mobility, policy changes, and marketing (Hemsley-Brown and Oplatka 2015, 7-9), there is a notable lack of emphasis on the usability aspects of accessing curricular information. This study addresses this gap by examining the user interface and navigation experience of curricular information across a select number of Finnish Universities of Applied Sciences.

In a world that changes as rapidly as skill demand does, maximising the salience of the curriculum may be a path to bringing out the flexibility and student-centeredness that Auvinen et al. (2007, 11) described. A university willing to embrace improvements in curricular access will likely bolster its value proposition. As a case in point, Oulu University of Applied Sciences (OAMK) and Arcada

were the only sites analysed that have done this to any extent. Perhaps that is one the unspoken reasons OAMK was recognised as one of the strongest higher education brands in Finland (Taloustutkimus 2023).

6 DISCUSSION

6.1 Business implications

The influence of culture on user interface is still a young area of study. Nizamani et al. (2022) suggested that heuristic evaluations for products intended for specific cultures use cultural and domain specific heuristic principles. If a program targets international students, it is crucial to understand how cultural factors and user interface effectiveness intertwine to optimize the design of international program webpages.

While the curriculum for prospective students may not be available until the application period begins each year, students can view previous years' curricula to get an idea of the university's priorities and how they communicate those to students. It is thus important that usability improvements extend to the whole of the academic portal.

It is imperative for universities to avoid treating the curriculum solely as a product. The 'product' offered by a university is a multifaceted experience, encompassing not just the academic curriculum but the entirety of the student's journey, including personal and intellectual growth. Marketing strategies should, therefore, endeavor to depict this holistic educational experience. While the curriculum remains a crucial component, it should be integrated into the broader narrative of comprehensive educational and life experiences offered by the university.

Raising of awareness of usability principles within universities can benefit not only the main website and the academic portal, but also learning management systems such as Moodle. The impact of improved usability can smooth some of the bumps in a student's academic journey, as well as serve as an example of good system design. Introducing user interface methodologies into existing course material can give students knowledge that they can use their careers.

The two universities studied that had a consistent look and feel between their main website and their academic portal are in a good position to innovate further. However it would be wise to do a thorough usability study on the existing platforms so that these innovations are based on user needs.

The curriculum itself is rendered similarly across all the analysed websites; however, this design could potentially be improved upon. The text of the curriculum should also be examined, as many fields are listed as “not applicable.” For example, ‘recommended literature’ field for almost all of the classes is conspicuously empty and prospective students who might want to explore the subject area might benefit from a broader understanding of the course’s contents before they commit themselves to applying.

6.2 Limitations

The evaluations made in this paper are meant to stimulate discussion on the topic of improving the saliency of informational material available to prospective students. However, these evaluations lack the perspective of the students themselves. To fully understand how informational aspects of the academic portal could be improved, universities must understand the needs of prospective students. Such an understanding of the student body requires long-term study of student needs and expectations over a student’s full duration at university. It is thus not within the scope of this study to measure the full value of the curriculum to the student.

Without usability testing with prospective students, this analysis is only a starting point. Before a design can be tested, it must be understood. While this paper’s goal was to give a better understanding of the user’s experience, it is not the user’s experience until that experience is observed.

This study was done in the autumn, after the current year’s (2023) students had started and before the curricula for the coming school year were published. There is the possibility that curricula are more directly linked with programme pages when the next curricula are released. While this could relieve some of the challenges that this study’s hypothetical user faced, the challenges are still present during the autumn and addressing them will enhance the user experience of prospective students that may be researching their options outside of the application cycle. Evaluations of the accessibility of web content should be ongoing.

This study also focused on a singular path in the user’s journey, whereas realistically students may take a meandering approach to their browsing of university websites. Various paths through the

main website should be examined to raise awareness about the signs that the user encounters on their journey to the curriculum.

6.3 Further research

Future research could examine the myriad paths that users can take to access the curriculum. Analytics could uncover patterns that users employ to use the site and to reach the curriculum and course information. Gathering insights from students on how they use the curriculum, to assess their educational decision-making, and then asking them to reflect on their experiences once they have joined the university family, would allow universities to better situate the curriculum in the university's main website.

One aspect that is strongly recommended for future research is usability testing. Building on the starting point that this study provides, further research could focus on identifying specific user interface challenges. Prototypes and questionnaires can be used to evaluate the interface of both the main website and the academic portal with the aim of better meeting the needs of students and adding to the educational value of the curriculum.

Considering the prevalent use of mobile devices among prospective students, future cognitive walkthroughs should not overlook mobile platforms. Balancing the need for effective information with the constraints of mobile device screens could add to the university's perceived value.

In this cognitive walkthrough of the user was exposed to much of the marketing content of the university's main website. An exhaustive content analysis of the messaging encountered along this journey can yield valuable insights. Identifying specific messages that can help the student better understand the curriculum that they are seeking can amplify the trust and integrity that universities project.

The role of underlying enterprise systems that drive many of the interfaces warrants further examination. To what extent do they allow for customisability? How does relying on an enterprise system affect budget, time and expertise available at the university? Do the companies responsible for these systems run usability tests themselves? These are questions that universities should ask of their chosen enterprise system company.

Finally, examining how the curriculum affects the messaging in the university's main website—how the language describing the courses affects the promotional rhetoric—has the potential to uncover similarities and differences between the two. A cohesive narrative could enhance a university's overall market position.

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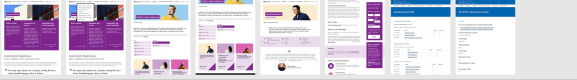

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NAVIGATION CLICKS TO THE TRANSITION LINK OF SOME SITES

APPENDIX 2

