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Do User Experience (UX) Design Courses Meet Industry's Needs? Analysing UX Degrees and Job Adverts

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ABSTRACT With the recent growth in demand for skilled user experience (UX) practitioners, there has been a significant expansion of higher education UX degree courses. Yet, despite increasing educational provision, UX design industry figures criticize UX degree courses for not meeting industry's needs. To examine the issue, this study asks: (1) What competencies are specified by UX degree courses? (2) How

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do UX and UX related degree courses' competencies and employers' requirements align? To answer these questions, the researchers analysed 93 programme and module specification documents for 34 UX, and UX related, degree courses and 50 job adverts for UX designers in the UK. The study concludes that UX, within formal education, is narrowly reliant on already established subjects and yet to mature into a holistic discipline. UX curricula are also developing in diverse ways across different institutions. Finally, the findings reveal that industry and academia have different priorities. The study underscores the need for further research into UX practice and pedagogy, cross-institutional cooperation, and enhanced connections with the communities of UX practice.

KEYWORDS: design, UX, pedagogy, employability, careers

Introduction

The creative industries and higher education (HE) assume that User Experience design (UX) courses deliver appropriate skills, knowledge, and abilities to produce competent UX designers. Their assumption, while foundational, is vital to the creative industry's health.

UX courses developing competent designers is pressing now because demand for UX designers is strong, as UX is integrating with interactive media, technology companies are expanding their design teams and businesses embrace UX design (Maeda 2018; Sheppard et al. 2018). Looking ahead, occupations – such as UX design – that engage with sociotechnical systems and design, are also set to feature strongly in future occupational demand (Bakhshi et al. 2017) and will, therefore, be vital for the UK's international competitiveness.

Despite UX's growth, the relevance of UX education to industry needs is in question internationally, and not only in the UK (Bjoran 2016; Buzzard 2016). Established design disciplines – including industrial design and ergonomics – have an agreed definition of the professional role, with a recognized body of disciplinary knowledge and a clear path to professional practice that guides educational curricula. UX design lacks such co-ordination; remaining an ambiguous concept despite its increasing presence (Lallemand, Gronier, and Koenig 2015). UX is, also, a design practice shaped by diverse groups of practitioners and disciplines leading to a '*diffuse and decentralised body of UX-specific disciplinary knowledge*' (Kou and Gray 2019). As a result, UX courses are challenged by the lack of established concepts, theory, and centralized guiding bodies that support other design disciplines.

To develop an effective curricula, course leaders consider the learning context, the intended learning outcomes, and the course's

relationship to industry and society (Stefani 2008). Of these considerations, intended learning outcomes – which specify knowledge and skills (competencies) that educators expect learners to grasp – are significant. Defining learning outcomes allows academics to set objectives that support the student's thinking and learning strategies (Cowan and Harding 1986; Winch 2013). If the UX industry is concerned that entrants lack the knowledge, skills and ability to practice, it is necessary to scrutinize UX degree courses' intended learning outcomes and their level of appropriateness for the UX industry.

Inspecting the UX pedagogic literature, several studies have underlined the dynamic, subjective and situated nature of competence in UX. For example, perceptions of competence in UX changed as students and early career designers entered the workplace (Gray 2014). Competence in UX has also been shown to be influenced by the relationship between designers and the diverse array of organizational settings they practice within (Gray, Toombs, and Gross 2015). In a further study of UX practitioners, Gray (2016) discovered that rote learning of UX methods was necessary for basic practice. However, effective professional practice, relied more heavily on the designer's judgement and '*mindset surrounding [the method's] use*' Gray (2016, 4051). More recently, an emerging UX vocabulary, employed by practitioners to communicate UX knowledge, has also been identified through a study of online communities (Kou and Gray 2019). Although these studies significantly advance our knowledge of UX competency, limited research considers how employers hiring UX designers – and HE institutions – define UX design's competencies.

This study aims to establish HE courses' and industry's conception of UX design capabilities in the UK. By defining UX design competence, the study should inform UX curricula design and the development of competent professional UX designers. To address this aim, the study pursues the following research questions.

1. What competencies are specified by UX degree courses?
2. How do UX and UX related degree courses' competencies and employers' requirements align?

To answer these research questions, the study analysed 93 module and programme specification documents for 34 UX – and UX related – degree courses and 50 job adverts for entry-level UX designers in the UK. Our results provide an insight into the desired competencies of UX employers and the wider HE field's interpretation of UX design. The results will support HE institutions in situating courses against the field's broader interpretations and enhance curricula design.

Literature review

Defining UX

UX design emerged in the 1990s with Apple's design focus on the user's emotions over adding features for competition or technology's

sake (Norman 2002). Within academia, the discipline of UX design has been defined as an effort to include a deeper consideration of the *'emotional, subjective, and temporal aspects'* in the interaction design process (Lallemand, Gronier, and Koenig 2015, 36). Because of UX design's origins in interaction design, UX design has a considerable overlap with the concept of usability – which addresses increasing performance, satisfaction, and the efficiency of achieving tasks with interactive systems. UX, however, extends usability's remit by considering the broader range factors that enable people to have functional and satisfying experiences with technology. Literature agrees that such experiences emerge from interactions between the user, the product or system, and the context-of-use (Forlizzi and Ford 2000). UX designers, therefore, adopt a user-centred approach to their work, prioritizing '*prior experiences, attitudes, skills, habits, and personality*' of the user over time (British Standards Institution 2019, 8). The UX designer also attends to social, cultural, and organizational contexts to ensure the design is appropriate. Taking on board these insights, UX represents a *holistic* perspective on a user's interactions with technology. Because of this holistic perspective, UX design encompasses a wide range of knowledge and skill domains. These include: user-centred design, user research, psychology, visual design, interaction design, prototyping, usability and accessibility, and testing and evaluation (British Standards Institution 2019; International Usability and UX Qualification Board 2018; British Computer Society 2018).

For educators to design curricula that develop competent UX designers, UX's holistic nature requires a cross-disciplinary approach, which poses a challenge. Cross-disciplinarily means '*thinking and working across disciplinary perspectives*', which entails adopting different tools, methods, exempla, concepts, and theories (Adams et al. 2009, 340). Courses are, therefore, tasked with developing UX designers that can engage with an *'ever-greater range of disciplinary perspectives'* and contend with an *'increasing messiness of knowledge boundaries and core knowledge'* (Gray and Kou 2019, 13).

Understanding competence

Competence is a persons' ability to meet a complex demand through *'a combination of interrelated cognitive and practical skills, knowledge and personal qualities such as motivation, values and ethics, attitudes and emotions'* (Rychen 2004, 321). Competence is, therefore, a more general term than skill – concerning the demand, an individual's performance, dependent upon on their skills, knowledge and personal attributes, and the work's context.

Within the UK's HE institutions, learning outcomes describe competencies. Learning outcomes are statements *'of what a learner is expected to know, understand and/or be able to demonstrate after completion of a process of learning'* (QAA 2009, 18). These

objectives form a vital part of the *constructive alignment* system that underpins the UK's HE pedagogy (Biggs 2003). For this study, learning objectives' widespread use provides an accessible way to grasp the competencies that UX, and UX-related, HE courses teach. These renderings, however, offer only a partial view of teaching delivery. Whilst this competency-based view of education, has been criticized for not adequately accounting for subjective and social aspects of learning (Wenger 2000; Northedge 2003; Fawns, Aitken, and Jones 2021).

Towards professionalization

Tran and King (2007) define professionalization as a process whereby an occupation works toward becoming a profession – giving its members a shared identity and greater control over their work's definition and regulation. Evetts (2003, 397) states that professions are distinguished by being: *'the knowledge-based category of occupations which follow a period of tertiary education and vocational training and experience'*. A key defining feature of a profession is, therefore, establishing a specialized body of knowledge. This specialized body of knowledge and theoretical grounding, offers a '*certain degree of abstractness in the description and application of the work*' (Tran and King 2007, 135). Enabling the discipline to be versatile, adapt to changes over time, and for individuals to engage in professional discourse with a shared understanding.

Because specialized knowledge is key to professionalization, a formalized process of education, training, and certification is vital to ensure that the field has a degree of consistency and can be sustained. For Kou and Gray (2018), it is the lack of these formal means of standardization within UX design that is creating volatility in the skills of job seekers and expectations of employers. However, recognizing that the end state of becoming a profession may not be appropriate, achievable, or even desirable for occupations like UX, emerging in the digital era. The notion of moving '*towards professionalisation*' is put forward, as a useful frame for thinking about how *'UX practitioners endeavour to develop their work and grow power within organisations and society'* (Kou and Gray 2018, 330). Recent studies show how this is happening within the discipline of UX, via grassroots interactions among UX practitioners in online communities (Gray and Kou 2019; Kou and Gray 2018).

Methods

This study used thematic analysis to examine course documents and job adverts, following Braun and Clarke's (2006) procedure. The three authors sought to identify patterns in data relevant to competence in UX design, from publicly available education and job adverts. The research purpose was to document the knowledge, skills and attributes taught on dedicated UX design courses and draw

comparisons between the content of UX and UX-related courses and the needs of employers.

Setting and sample

To address the research questions, the study focussed on UX and UX related course specification documents and UX design job adverts that were publicly available in the UK; from January to March of 2019. The authors focussed on the UK because of the current literature's limited pedagogically scholarship addressing UX design outside of North America.

The sample consisted of course specifications for 32 UX, and UX-related HE courses; as identified in Tables 1 and 2. The sample comprised ten dedicated UX courses, 15 courses with *interaction* in the title, and seven Human-Computer Interaction (HCI) courses. The sample also included 50 job adverts for '*UX Designers*' collected during January and March 2019.

Data collection

The authors searched for UX and UX-related HE courses via the Universities and Colleges Admissions Service website (UCAS 2019) using the search terms: User Experience Design, Interaction Design, and Human-Computer Interaction. Based on the search results, 93 programme and module specification documents were downloaded from the relevant institution's websites. These publicly available specification documents contained information about the courses, comprising: the degrees, teaching content and the intended learning outcomes. HE institutions create these specification documents to inform students, employers, and educators about their courses. Internal validation and review panels, external examiners, and regulatory bodies also use specification documents for quality assurance and administration purposes.

The researchers searched for UX Designer job adverts via prominent job aggregator websites (UX Jobs Board, REED, and Monster Jobs) while conducting the HE courses search. Recruitment agencies posted these adverts, searching for candidates in a wide range of sectors – including creative agencies, healthcare, financial services, travel, and technology. The initial search query returned 4,536 results; far more than could be analysed through thematic analysis. The researchers, therefore, applied inclusion criteria to reduce the sample size. All job adverts had to include the term '*UX Designer*', which removed results that were not directly relevant UX and design. The same frame also excluded adverts recruiting senior UX designers, as these positions would not typically be suitable for graduate applicants. The researchers created a list of the remaining job adverts numbered 1 to 283, then manually checked the sample to avoid duplicate job adverts. To randomly select 50 adverts, an online random number generator (www.randomizer.org) was used to pick

Table 1. UK undergraduate and postgraduate degree programmes in UX design.

Courses	*Institution*	*School/Department*	*Award*
A. User Experience Design	University of Brighton	School of Computing, Engineering and Mathematics	MSc
B. User Experience Engineering[1]	Goldsmiths, University of London	Department of Computing	MSc
C. User Experience Design	Kingston University	Faculty of Science, Engineering and Computing	MSc
D. User Experience Design	University of Central Lancashire	School of Physical Sciences and Computing	MRes
E. User Experience Design	Loughborough University	Design School	MA
F. User Experience Design	University of the Arts London, London College of Communication	Design School	MA
G. Computing and User Experience	Edinburgh Napier University	School of Arts and Creative Industries	BSc (Hons)
H. User Experience Design	University of the Arts London, London College of Communication	Design School	BA (Hons)
I. User Experience Design (UX)	Norwich University of the Arts	Architecture and Design	BSc (Hons)
J. User-Experience and User-Interface (UX/UI) Design	Ravensbourne University London	School of Design	BA (Hons)

Table 2. UK undergraduate and postgraduate degree programmes in UX related subjects.

Courses	*Institution*	*School/Department*	*Award*
Interaction Design Arts	University of the Arts London, London College of Communication	Design School	BA (Hons)
Interactive Digital Technologies	University of Bedfordshire	School of Computer Science and Technology	BSc (Hons)
Digital Media and Interaction Design	Edinburgh Napier University	School of Computing	BSc (Hons)
Interaction Design	Glasgow School of Art	School of Design	BA (Hons)
Graphic Design (Interactive)	De Montford University	The Faculty of Technology	BA (Hons)
Information Systems (Interaction Design)	Heriot-Watt University	School of Mathematical and Computer Sciences	BSc (Hons)
Interaction Design	Northumbria University	School of Design	BA (Hons)
Interaction Design	University of Lincoln	School of Design	BA (Hons)
Interaction Design	Norwich University of the Arts	Architecture and Design	BSc (Hons)
Interaction Media	University of York	Theatre, Film and Television	BSc (Hons)
Design Innovation and Interaction Design	Glasgow School of Art	School of Design	MDes
Design (Interaction)	Sheffield Hallam University	Art and Design	MA
Information Experience Design	Royal College of Art	School of Communication	MA
Interaction Design Communication	University of the Arts London, London College of Communication	Design School	MA
Interaction Design	Edinburgh Napier University	School of Design	MA
Human-Computer Interaction	University College London	Psychology and Language Sciences	MSc

(*Continued*)

Table 2. (*Continued*).

Courses	*Institution*	*School/Department*	*Award*
Human-Computer Interaction	University of Bath	Department of Computer Science	MSc
Human-Computer Interaction	University of Birmingham	School of Computer Science	MSc
Human-Computer Interaction	City, University of London	School of Mathematics, Computer Science & Engineering	MSc
Human-Computer Interaction	University of York	Department of Computer Science	MSc
Human-Computer Interaction	University of Nottingham	School of Computer Science	MSc
Human-Computer Interaction	University of St Andrews	School of Computer Science	MSc

data rows (Urbaniak and Plous 2013). For analysis, a dataset of 50 job listings was captured using the web browser extension: Evernote Web Clipper (Evernote 2020).

Data analysis

The study employed thematic analysis supported by NVivo 12 (QSR 2019) to programme specification documents and job adverts to address the two research questions.

To determine the competencies UX degree courses specify (RQ1), the researchers analysed the module titles of the ten dedicated UX courses running in the UK at the time of the study in 2019. The module titles were gathered, sorted, and analysed for patterns using Microsoft Excel to reveal dominant or reoccurring subjects. This analysis would enable the researchers to characterize the teaching content of UX courses.

To determine how UX and UX related degree courses and employers align on competence (RQ2), the researchers applied thematic analysis to the learning outcomes of the 32 HE courses and the 50 job adverts. The researchers first familiarized themselves with the data by reading the material, then coded pertinent features in the data set. Potential high-level themes were then established inductively from these data-driven codes and discussions of competence within design and UX pedagogy scholarship (Faiola 2007; Vorvoreanu et al. 2017). To check for coherence, the research team worked iteratively to review the themes for correlation with the codes, learning outcomes and job descriptions. The final themes and subthemes were then defined (Description) and named (Competency Domain) as shown in Table 3. While inter-rater reliability statistics were not applied between researchers in a double-blind coding approach, all team members reviewed, discussed, and agreed upon all coding before applying cross-comparison analysis to reveal themes.

Results

UX degree course competencies

The researchers identified 104 module titles representing 82 compulsory and 22 optional modules for ten UX design courses. Only a few of the module titles were, however, shared by a more than one of the courses. It was, therefore, necessary to aggregate the module titles into six higher-level competency domains, in order to reveal patterns in the modules different institutions offered. Table 4 presents how the ten UX courses relate to UX competencies.

Table 4 shows that UX courses' modules focussed on Visual and Interaction Design (26%) and Technical Skills (19%), reflecting established subjects' dominance on emerging UX curricula. Whilst a marked disparity was detectable when comparing course 'G' –

Table 3. High-level competency domains.

Competency domain	*Description*
Visual and Interactive Design	Design concepts, practices and outcomes, including interaction design, visual design, user interface design, prototyping, and design thinking.
Research and Evaluation	Processes to understand users, contexts and test outcomes, including qualitative and quantitative methods, user modelling, user research, and testing.
Technical Skill	Advanced technical knowledge, including human-computer interaction, programming, software design, and development.
Transdisciplinary	Disciplines outside of design, including entrepreneurship, ethics, sustainability, psychology, and human factors.
Leadership and Teamwork	Project management and interpersonal skills, including methodologies, critical thinking, collaboration, and communication.

where nine modules reference technical skills – with course 'H' – where no modules reference technical skills in their titles.

Established subjects' dominance and the lack of holistic teaching

The high number of modules titles within Visual and Interactive Design reflects a bias toward established subjects, including graphic design and interaction design. Examples of module titles in this domain were: Interactive Data Visualization; Interface and Interaction Design; Information Visualization, and Typography. Technical Skills also represented a significant share of the UX teaching, particularly in institutions with strengths in computer science and related subjects. Examples of module titles in this domain were: IT Projects and Programmes, Physical Computing and Human-Computer Interaction.

Despite the literature review revealing UX design to be synonymous with holistic approaches to design. This analysis of HE, UX course modules revealed a narrower view on the skills students require. This finding was evident in the domain of Research and Evaluation that accounts for only 7% of all the modules. Amongst the taught modules, HE institutions rely on general subject areas with compulsory modules – such as Media Specialist Practice, Design Thinking, and Contextual and Theoretical Studies.

Diverse curricula across institutions

Across the different HE institutions sampled, there was a high level of diversity in teaching content. For example, a variation in course content is evident when comparing programme 'G' with programme 'H'.

Table 4. UX degree course modules categorized by competency domain; cells equal number of modules.

	Dedicated UX Courses											
	Postgraduate					*Undergraduate*						
Competency domains	*A*	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*Total modules*	*%*
Visual and Interaction Design	5	2	1	1	1	0	6	4	0	7	27	26
Technical Skills	1	4	1	2	0	0	9	0	0	3	20	19
Transdisciplinary and Contextual	2	4	0	1	2	0	3	2	1	3	18	17
User Experience Design	0	1	2	3	1	3	0	1	3	2	16	15
Final and Group Work	2	0	1	2	2	2	0	3	1	3	16	15
Research and Evaluation	2	2	0	1	1	0	0	0	1	0	7	7

Shading was used to differentiate high and low values. Shading can be removed if it makes the table clearer.

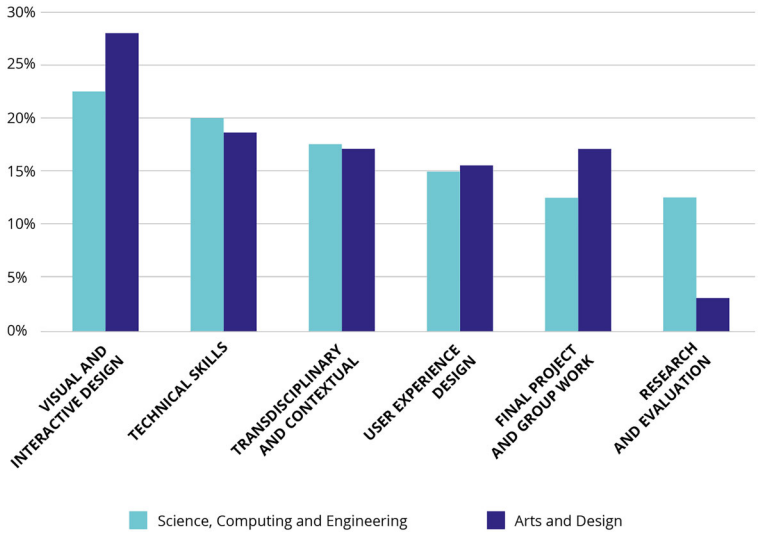

Figure 1.
Modules categorized by competency domain for UX degree courses. Comparison of courses issued by science, computing and engineering departments with courses issued by arts and design departments.

Programme 'G' is offered by a large university's computing department, while programme 'H' is offered by a university specializing in creative arts. Course 'G' breaks UX into 18 modules focussing on technical subjects; for example: Sound Theory, Sensing Systems for Mobile Applications, and Database Systems. Course 'H', in contrast, breaks UX into ten modules focussing on design and creativity skills; for example: Introduction to Information and Interface Design; Information Visualization and Typography; Animation and Coding for the Web.

When comparing the modules of UX courses issued by science, computing, and engineering departments with the modules of UX courses issued by arts and design departments (Figure 1) there were also disparities. Modules within the Research and Evaluation domain were far more prevalent in the science-based courses (13%) versus (3%) on the arts-based courses.

These findings suggest that the traditional institutional and disciplinary areas offering UX courses play a more significant role in shaping the curricula than UX practice – leading to highly diverse UX courses.

UX courses' and employers' alignment on competence?

Figure 2 visualizes the thematic analysis's results for 32 UX and UX related HE courses and 50 job adverts. The difference in percentage of total references between HE and job adverts demonstrates the limited alignment in terms of UX competencies.

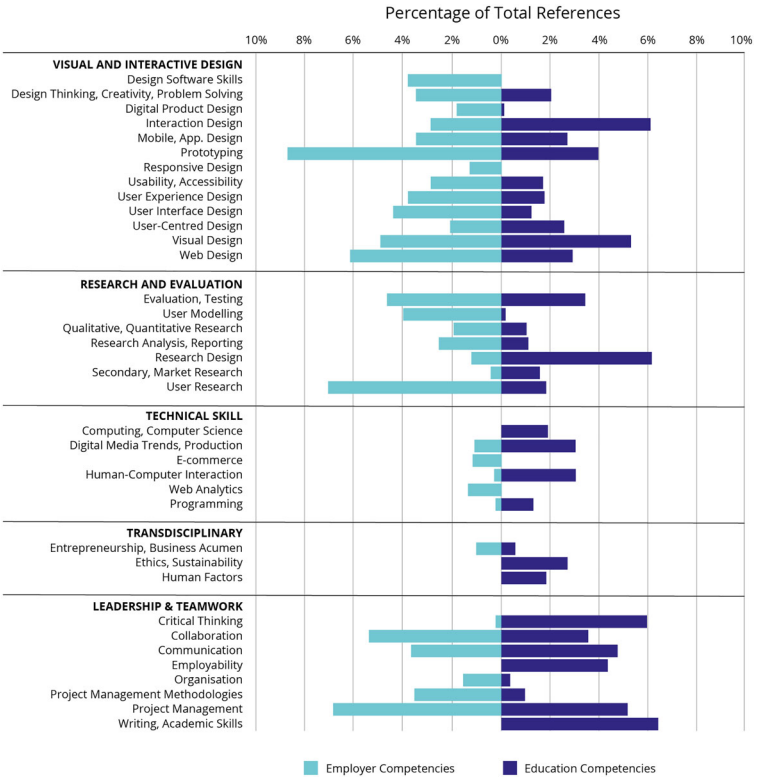

Figure 2.
Competencies in UX and UX-related course documents compared with those referenced in job adverts for UX designers.

The analysis shows HE institutions and employers have different priorities on UX competencies. This study's literature review revealed areas of knowledge and skill central to UX design practice, including User-Centred Design; User Research; Psychology; Usability and Accessibility; Testing, and Evaluation. It was therefore surprising to find that these competency domains did not claim a larger share of the total references (Figure 2)

Our results show that HE institutions are not furnishing UX students with the skills UX job adverts specified. Employers prioritized practical competencies associated with production in the Visual and Interactive Design domain. HE institutions, however, emphasize transferable, cognitive, and interpersonal competencies in the Leadership and Teamwork domain.

Industry and academia's different priorities

For employers, the most sought-after competencies were: Prototyping (9%), User Research (7%), Project Management (7%) Web Design (6%), and Visual Design (5%). Employers, therefore, prioritized shorter-term, practical knowledge and skills required for UX design's practical applications. Employer's practical focus is

unsurprising given managerial accountability and the dominance of metrics in the digital economy. Prototyping and User Research were not well represented in the course documents, with a 5% disparity compared with employers. Aligning with employers' practical focus, pragmatic capabilities, including User Modelling and Design Software Skills were in high demand. Applicants were also sought with skills in Digital Product Design, Responsive Design, e-Commerce, and Web Analytics. But UX and UX related course documents did not reference these four vital capabilities.

The most prominent competencies within the course documents were Interaction Design (6%), Writing and Academic Skills (6%), Research Design (6%), Critical Thinking (6%), and Visual Design (5%). These findings underline that educators are less inclined to emphasize specific production tools and methods. Courses instead, emphasize communication and interpersonal skills, as the high percentage of references (31%) for the category of Leadership and Teamwork demonstrate.

Discussion

UX degree course competencies

Our results show that more established subjects dominated UX curricula, with *Visual and Interactive Design* and *Technical Skills* competency domains capturing 45% of total teaching. An unexpected finding was the lack of teaching that addresses UX practice's holistic nature. For example, competency domains central to UX – such as human or user-centred design, user research, and testing and evaluation – were not as prevalent as expected. The analysis also revealed that UX curricula are developing in diverse ways with some courses opting for a strongly technical focus, whilst other pursued design-led approach to the topic. The existing strengths of the departments offering the courses also influenced the curricula.

Established subject's dominance within UX curricula was a prominent theme in the data. Institutions were heavily reliant on existing subject strengths to create their UX courses, while topics central to the UX design, were less prevalent. This finding reflects academia's cautious approach to the development of UX courses. This finding resonates with Kou and Gray (2019, 3) assertion that *'UX-focused pedagogy and formal educational programs are lagging'*. Academia's hesitant approach to the subject – and narrow focus on visual and interaction design – reflects that HE's UX courses are still emerging. These deficiencies underline the need for more research into UX practice and pedagogy to support the development of the field in academia; as called for in previous research (Gray 2019). In particular, researchers have identified that designer's everyday practices and communications should inform future pedagogic studies to improve alignment between curricula and practice (Stolterman 2008; Gray, Stolterman, and Siegel 2014).

A focus on technical skills was also notable in the data and reflected a broader issue that effective practice is – too often – framed in terms of technical concerns; knowing the right tool, method, or software. As Gray (2016) observed – in a study of students beginning professional UX practice – the vital competencies needed to practice successfully were less content-oriented. The importance of an appropriate mindset and judgement was, instead, emphasized; summarized as *'attitudes and approaches to negotiating complexity, collaborating in corporate environments, and communicating with diverse stakeholders in order to effectively advocate for users'* (Gray 2016, 4052). These are the less tangible competencies that are overlooked by a technical focus on tools and methods (Hanington and Martin 2012). In response, contemporary UX and digital education is exploring a more holistic approach that puts students' professional identity formation, norms and values, at the centre of curricula design (Gray, Parsons, and Toombs 2020; University of Edinburgh 2019).

The diversity of curricula between institutions this study reveals, resonates with Kou and Gray (2018) observations of UX university degrees in North America. Kou and Gray (2018) identify that HE's traditional disciplines creating UX courses – e.g. Computer Science – influence the curricula. This influence leads to diverse and occasionally contradictory areas of focus between universities. Although diversity should be encouraged as it reflects an emerging discipline, Kou and Gray (2018) identify that it challenges professionalization and associated standardization. In this context, it is vital to acknowledge that occupations, emerging from the digital economy, like UX, are maturing and moving '*towards professionalisation'* (Kou and Gray 2018, 330) in a decentralized way. Meaning that the discipline and its knowledge is developing disparately, via diverse, formal and informal, communities of educators and practitioners. UX's fragmented evolution presents challenges to the traditional role of HE in supporting the maturation of a discipline. Questions concerning knowledge transfer between the academy and the various communities of practice are most pressing in this context. UX educators should, therefore, explore ways to facilitate greater cross-institutional cooperation. Examples of this type of cooperative endeavour in other subjects, include the educational efforts of the Interaction Design Association (IxDA) and Graphic Design Educators Network.

HE and industry alignment

Our results reveal the competencies HE UX, and UX-related, courses teach are not well aligned with the competencies employers require. Employers place a greater emphasis on practical tools and methods. Educators, however, place a greater emphasis on cognitive and interpersonal skills. This finding was reflected in the high share of references to Visual and Interactive Design (50%) and Research and Evaluation (22%) within job adverts. While within the UX and UX

related course documents, the Leadership and Teamwork competency domain had the highest total share of references (31%).

Concerns about the alignment between industries' demands and HE institutes' supply of graduates is not new, or unique to UX design. As Winterton and Turner (2019) outline, employability has been a recurrent theme within the UK's HE sector for more than half a century. As Atkins (1999) states, one of the problems with basing curricula on employer requirements is that it assumes that employers form a consensus on the skills their industry needs. No such consensus was evident in our findings. It is likely that the UX design needs of different types and scales of businesses, in a variety of regions, are going to be different. Based on this perspective, the alignment that may benefit the occupation most and is worthwhile for HE to pursue, lies with a better understanding of the situated practices of UX designers. This closer examination of actual UX design work may reveal competencies that do not show up in employers' communications.

In designing UX curricula, UX educators must balance industry's clamour for '*plug and play employees*' (Winterton and Turner 2019, 544) with the reality that UX design is rapidly evolving in response to technological innovation and changing market expectations (Rosenberg 2019). In the context of such a diverse, changing discipline, the competencies students require to be an effective designer are increasingly unstable. To meet these challenges, there is an imperative to continue to develop transferable competencies that underpin successful design practice in the longer-term. For example, competencies, such as, critical thinking, lifelong learning skills, adaptability, and interpersonal skills are vital. In this sense, it is encouraging that competencies in the Leadership and Teamwork domain had such a strong presence in the data for UX and UX related courses. A focus on high quality partnerships between industry and academia is also essential. Investment in academics to develop longer-term projects with industry that provide greater mutual benefits, will help to address the lack of graduate preparedness that concerns industry figures.

Conclusion

This study set out to determine HE courses' and industry's conception of UX capabilities in order to direct UX curricula design and the development of competent professional UX designers. Our findings reveal that UX, within HE, relies on already established subjects and yet to be confidently developed as a holistic disciplinary offer. There is also limited agreement between institutions on the skills, knowledge, abilities within the curricula; contributing to junior UX designers' volatile skillset. When comparing curricula competencies with industry demands, different priorities become apparent. With industry targeting short term production needs and academia focussing on longer-term inter-personal and communication skills.

The study underscored the need for further research into UX practice and pedagogy.

As industry evolves to remain competitive and the market's demands change, HE institutes must respond. This study, therefore, recommends further research into everyday UX design practices. Further exploration of holistic approaches to curriculum design, that emphasize the development of learner's identities and values, as well as tools and methods. Greater cooperation between different courses and institutions. Investment in academics to develop mutually beneficial, long-term collaborations with industry that will help prepare learners for starting work.

Our thematic analysis revealed underlying themes within UX and UX related higher education. The methodology is, however, limited by omitting a quantifiable level of agreement amongst the research team. Further research involving quantitative categorization of courses with corresponding inter-rater reliability measures of such classification, would give further credence to our study's findings. Furthermore, the researchers recognize that the sample of 50 job adverts may also limit the generalizability of the findings in this study. Expanding future research to include a broader selection criteria will offer more in-depth insights into how our findings relate to other, as yet unexplored, areas of industry. Finally, focussing on the UK's UX design courses and professional requirements also limits this study. Future research should consider answering how our outcomes relate to international settings; particularly in Asia, which has considerable growth in UX design.

Job adverts and HE curricula documents also have different objectives and audiences that might influence these findings. For example, job adverts might be specific about the competencies they seek to reduce applications from unsuitable candidates. In contrast, educators may write programme specifications in a general style to enable flexibility in teaching delivery and appeal to a broader range of students. HE's publicly available documents, therefore, can only represent part of their perspective. By interviewing HE and industry representatives, the researchers plan to gain a more in-depth explanation of the phenomena this study presents.

Disclosure statement

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