Creative Industries
Policy & Evidence Centre
Led by **nesta**

The Creative Digital Skills Revolution

Hasan Bakhshi, Jyldyz Djumalieva and Eliza Easton

October 2019

Previous research shows that combinations of skills – technological, artistic, organisational and management - are important for creative work. A common finding in studies on the future of work is that employers will increasingly demand digital skills and creative skills. Some studies go further and suggest that the sweet spot will be where digital skills meet creativity.

But what are these so-called 'createch' skills? Which roles require them? And how do we know they will become more important in the future?

In this paper we look at 35 million jobs adverts from the seven years 2011-2018 inclusive to answer these questions. The data was sourced from Burning Glass Technologies, the leading producer of online job advert data in published academic research.

Identifying 'createch' skills

To identify 'createch' skills in a big data set we first need a data-driven way of determining what makes a skill creative and what makes it digital.

In this analysis, to find **creative** skills we look for those skills that have the strongest positive association with the word 'creativity' in the text of job adverts that make up our dataset. No automated procedure is perfect, but we find that such an approach gives sensible results. We find 148 skills this way.

It is a less straightforward process to distinguish between **digital** and non-digital skills, particularly when skills that would have once been non-digital (e.g. graphic design) are now reliant on the creative use of software.

To address this challenge, we use a two-step procedure.

In the first step, we treat as digital those skills that are automatically tagged as digital by Burning Glass Technologies.[1] These tend to be skills which are obviously digital in that they relate to the use of a particular piece of software. Of the 148 skills we identify as 'creative', 24 of these are defined as digital, such as Adobe Photoshop, Final Cut Pro, Cinema 4D and HTML5 (Table 1).

Table 1. Skills that are both Creative and Digital as defined by Step 1

Actionscript	Adobe Photoshop	Macromedia Fireworks
Adobe Acrobat	Adobe Premiere	Mailchimp
Adobe Aftereffects	Cinema 4D	Mastercam
Adobe Creative Suite	CSS	Omnigraffle
Adobe Dreamweaver	Final Cut Pro	Prezi
Adobe Flash	Google Analytics	Quarkxpress
Adobe Illustrator	HTML5	Social Media Platforms
Adobe Indesign	LinkedIn	Visual Design

We then take the remaining 124 creative skills and look for those where the expectation of the employer hiring is that deploying the skill requires the use of a piece of software. We find these by first calculating the similarities between vectors for each of the 124 skills and all known software skills using a 'word embeddings' model trained on online job adverts, taking the average of the similarities. After this we analyse the distribution of the average similarities for the skills and consider as digitally-enabled skills those with average similarity above the 75th percentile in the distribution (Figure 1).

In other words, we look for the extent to which a skill is highly linked to the use of software by the employer. We find 30 additional creative digital skills in this way (Table 2).

Table 2. Skills that are both Creative and Digital as defined by Step 2

Art direction	Illustration	Residential design
Architectural draughting	Instagram	Sketching
Animation	Information architecture	Storyboarding
Creative design	Interactive design	Social media marketing
Content development	Motion graphics	Typesetting
Creative direction	Multimedia	UX wireframes
Digital design	Photo editing	Video editing
Front-end development	Post production	Videography
Graphic design	Photography	Video production
Interaction design	Quantitative analysis	Website design

The 75th percentile is, of course, an arbitrary cut-off point. Some skills we call digital are much similar to known pieces of software, with the five skills with the highest average similarity being Front-end development, Multimedia, Photo editing, Post production and Animation. Others just miss the cut off, although are often seen alongside software, like Brand Design.

Figure 1. Distribution of average similarity between creative skills and all known software skills (only values for non-software skills are shown, vertical line denotes a cut-off above which we treat skills as digital).
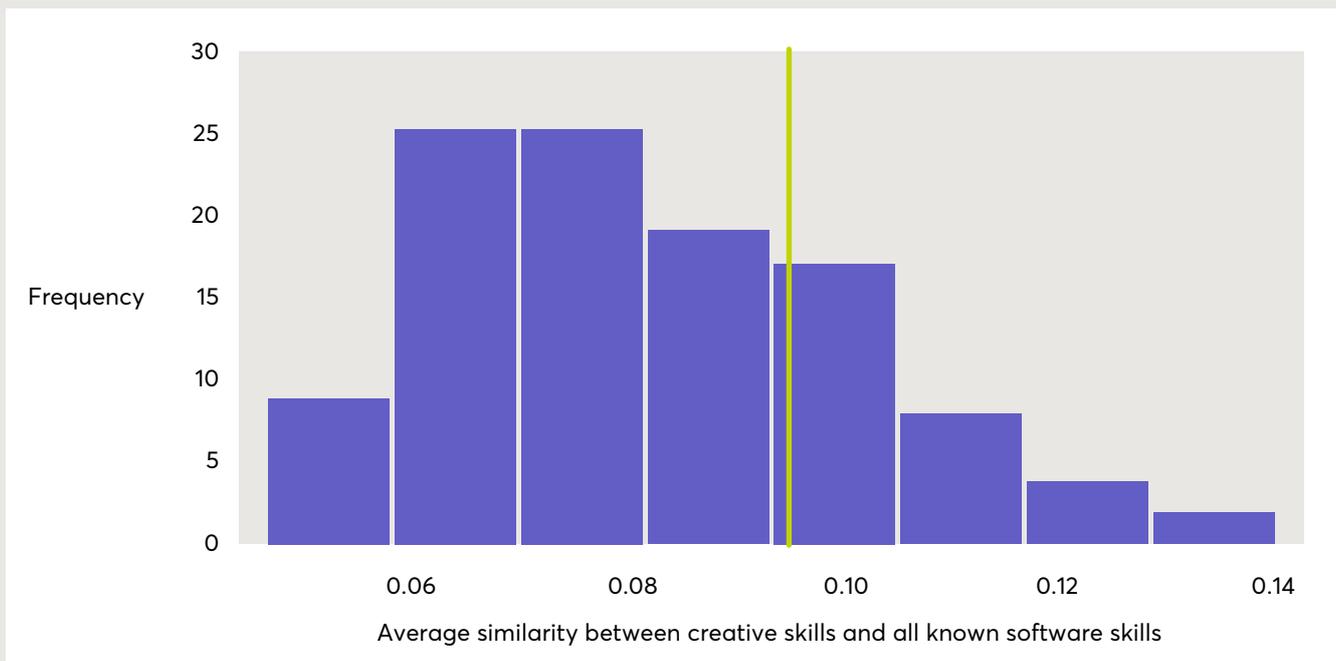
Using this methodology to separate digital and non-digital skills, and applying it to the 148 creative skills we have already identified, we therefore identify 54 'createch' skills in total. Table 3 shows the top 20 'createch' skills with the strongest association with creativity in 2018.

Table 3. The top 20 'createch' skills with the strongest association with creativity in 2018

1. Adobe Photoshop	11. Animation
2. Adobe InDesign	12. Website design
3. Adobe Illustrator	13. Creative direction
4. Adobe Creative Suite	14. Art direction
5. Adobe Acrobat	15. Motion graphics
6. Graphic design	16. Video editing
7. Creative design	17. Photography
8. Typesetting	18. Cinema 4D
9. Adobe After Effects	19. Adobe Premiere Pro
10. Digital design	20. Video production

It is important to reiterate that some skills do not appear as 'createch' despite being reliant on technology and commonly appearing alongside a job advert requirement of creativity. These include skills like Social Media and Email Marketing. Such technology skills are clearly complementary to creativity, but the job adverts suggest that they do not have creativity embedded within them, in the way that skills like Adobe Photoshop or Graphic Design have.

While computer programming skills such as Front-end development, HTML5 and CSS did not make it to the top 20 shown in Table 3, they still have demonstrated a strong positive association with creativity.

Which creative occupations are more reliant on 'createch' skills?

We now look at which Creative Occupations (that is, occupations classified as creative by the Department for Digital, Culture, Media and Sport[2]), are most likely to use 'createch' skills, according to the job adverts.

To carry out the analysis we first need to link job adverts to occupations. We use different approaches to identify the appropriate occupation code for a given online job advert, including information on Standard Occupational Classification (SOC) codes that has been provided by Burning Glass Technologies. Only 'reliable' adverts are used, those being adverts where the different coding approaches agree on the SOC code that should be assigned to the advert.

One way to measure the importance of 'createch' skills in occupations is by looking at how often 'createch' skills are mentioned as a percentage of overall skills mentioned in job adverts.

Table 5 (provided in the Annex) shows how the most important 'createch' skills vary across creative roles according to this measure.

Table 4. The five occupations that mention 'createch' skills the most in the text of adverts

Graphic designers
Photographers, audio-visual and broadcasting equipment operators
Artists
Arts officers, producers and directors
Product, clothing and related designers

It is important to note that in the current occupational classification (SOC 2010), even at the highest level of granularity the occupations may include diverse job roles. For example, Sculptors, Calligraphers, and Portrait Painters are assigned to an occupation called Artists. However, in the data that we use, we are much more likely to see adverts for Illustrators, Animators and 3D Artists, who also belong to this occupation. So the results provided in this analysis may not cover the whole variety of job roles in a given occupation and instead include only job roles that are often advertised online.
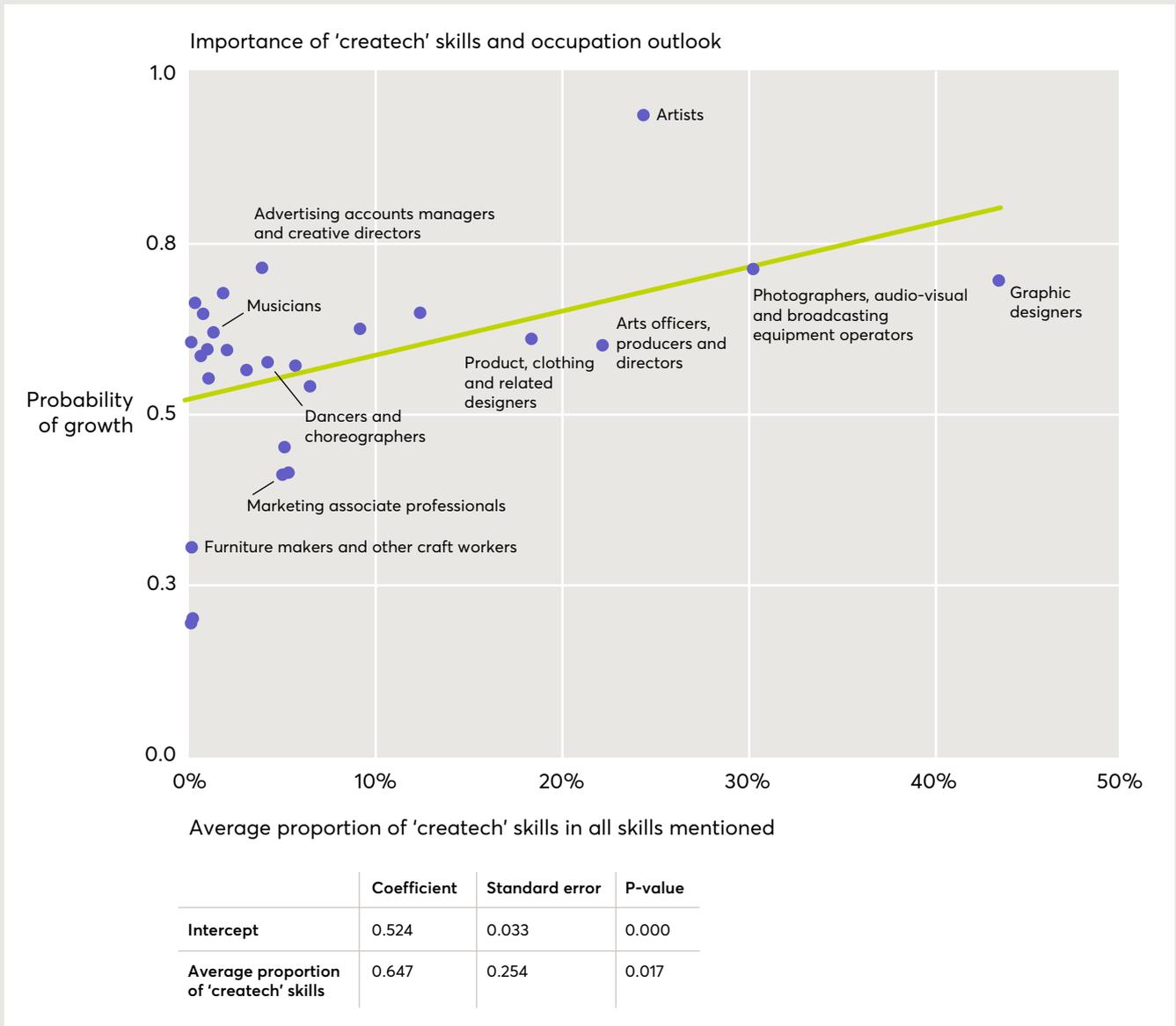
'Createch' skills and the future of work

Given the importance that future of work studies attribute to both creative and digital skills, it is reasonable to suppose that 'createch' skills will be associated with roles that are expected to grow in importance in the future. Is there evidence for this in the data?

To explore the relationship between 'createch' skills and occupational outlook we fit a simple linear regression model (the green line in Figure 2) of the probability of a job growing in the future (as estimated in Nesta's The Future of Skills (2017)[3] research) and the relative importance of 'createch' skills in job adverts for that job.

As Figure 2 shows, there is a positive relationship between the two. In other words, the greater prominence of 'createch' skills in job adverts is (significantly) associated with an increase in an occupation's probability of future growth.

Figure 2. Linear regression model illustrating the relationship between the probability of a job growing in the future (as estimated in the Future of Skills (2017)) and the proportion of 'createch' skills in job adverts for that job.

Importance of 'createch' skills and occupation outlook

	Coefficient	Standard error	P-value
Intercept	0.524	0.033	0.000
Average proportion of 'createch' skills	0.647	0.254	0.017

However, it is important to recognise that the importance of 'createch' skills accounts for only a small part of the variation in an occupation's outlook. We see that some occupations, like Musicians, have a relatively high probability of growth despite low requirements for 'createch' skills. Similarly, there are occupations like Graphic designers, Arts officers, producers and directors and Product, clothing and related designers which require 'createch' skills but which, on the basis of the relationship in Figure 2, might be expected to have even rosier future prospects than is predicted.

Limitations

Although there are many benefits to using job advert data to understand the labour market, there are also several limitations. The most significant of these is the fact that not all creative roles are advertised online, which may introduce bias in the analysis. For example, we may overstate the importance of 'createch' skills if over-represented roles in job adverts are more likely to require 'createch' skills.

In terms of types of occupations that might be affected, our analysis shows that creative occupation groups, such as 'IT, software and computer services', 'Architecture' and 'Design: product, graphic and fashion design', are well represented in online job adverts. However, other types of creative roles have less coverage. Some of the under-represented creative roles are in 'Crafts', 'Film, TV, video, radio and photography' and 'Museums, galleries and libraries'.

Despite these drawbacks, at this moment no other alternative data set offers comparable sample size and level of detail on the skills required by employers. Other potential sources, including project postings on freelance platforms, could be incorporated in the analysis in the future.

Conclusion

Studies of the future of work commonly conclude that combinations of creative and digital skills will become more valued by employers in the future. This study has used the job requirements as set out in 35 million UK online job adverts to identify such 'createch' skills and shown how these vary in nature and in importance according to creative role. We have compared these 'createch' skills with the occupation predictions in The Future of Skills and confirmed that 'createch' skills are associated with roles that are expected to grow.

Policy implications

Skills policy has a tendency to divide digital and creative skills, and digital and creative pathways, from one another. For example, in the T-Levels which are currently being developed in England as a technical equivalent to A-Levels, there is a Creative T-Level and a Digital T-Level.[4]

Our research suggests that not only should digital skills be embedded in many creative courses, but that course designers should consider how the two may have, for some roles, become inextricable from one another.

The findings of this research are also relevant for those designing courses at Higher and Further Education level, as they show that the assumption of recruiters in roles like graphic design and architecture is that those applying have software skills. The PEC has been consulting its Industry Champions on the subject of tertiary education, and concerns have been raised about the lack of up-to-date software skills in those graduating from a range of creative courses.[5]

Annex

Table 5. The average proportion of 'createch' skills in all skills mentioned in adverts for creative occupations

SOC	Occupation	Average proportion of 'createch' skills in all skills mentioned in adverts
3421	Graphic designers	43.5%
3417	Photographers, audio-visual and broadcasting equipment operators	30.3%
3411	Artists	24.3%
3416	Arts officers, producers and directors	22.2%
3422	Product, clothing and related designers	18.4%
2137	Web design and development professionals	12.3%
2431	Architects	9.1%
3413	Actors, entertainers and presenters	6.4%
2471	Journalists, newspaper and periodical editors	5.6%
3412	Authors, writers and translators	5.2%
3121	Architectural and town planning technicians	5.0%
3543	Marketing associate professionals	4.9%
3414	Dancers and choreographers	4.1%
2473	Advertising accounts managers and creative directors	3.8%
2472	Public relations professionals	3.0%
2136	Programmers and software development professionals	1.9%
2452	Archivists and curators	1.7%
3415	Musicians	1.2%
2451	Librarians	1.0%
1134	Advertising and public relations directors	0.9%
2432	Town planning officers	0.7%
1132	Marketing and sales directors	0.7%
2135	IT business analysts, architects and systems designers	0.5%
1136	Information technology and telecommunications directors	0.2%
5449	Other skilled trades n.e.c.	0.1%
5442	Furniture makers and other craft woodworkers	0.1%
5211	Smiths and forge workers	0.0%
5441	Glass and ceramics makers, decorators and finishers	0.0%

Table 6. Most common 'createch' skills in adverts

SOC code	Occupation	Top three most common 'createch' skills
3421	**Graphic designers**	Adobe Photoshop, graphic design, Adobe Indesign
3417	**Photographers, audio-visual and broadcasting equipment operators**	Photography, Adobe Photoshop, videography
3411	**Artists**	Animation, Adobe Photoshop, Adobe Aftereffects
3416	**Arts officers, producers and directors**	Video editing, Adobe Photoshop, video production
3422	**Product, clothing and related designers**	Adobe Photoshop, Adobe Indesign, Adobe Illustrator
2137	**Web design and development professionals**	Front-end development, HTML5, CSS
2431	**Architects**	Adobe Photoshop, Adobe Indesign, Adobe Acrobat
3413	**Actors, entertainers and presenters**	Photography, instagram, videography
2471	**Journalists, newspaper and periodical editors**	Multimedia, Adobe Indesign, Adobe Photoshop
3412	**Authors, writers and translators**	Adobe Indesign, Adobe Photoshop, storyboarding
3121	**Architectural and town planning technicians**	Adobe Photoshop, Adobe Indesign, Adobe Acrobat
3543	**Marketing associate professionals**	Google Analytics, Adobe Photoshop, Adobe Indesign
3414	**Dancers and choreographers**	Photography, Instagram, videography
2473	**Advertising accounts managers and creative directors**	Google Analytics, social media marketing, Adobe Photoshop
2472	**Public relations professionals**	Social media platforms, Adobe Photoshop, Linkedin
2136	**Programmers and software development professionals**	HTML5, CSS, front-end development
2452	**Archivists and curators**	Content development, photography, Adobe Acrobat

Table 6. Most common 'createch' skills in adverts (continued)

SOC code	Occupation	Top three most common 'createch' skills
3415	**Musicians**	Photography, videography, video production
2451	**Librarians**	Digital design, multimedia
1134	**Advertising and public relations directors**	Social media platforms, content development, linkedin
2432	**Town planning officers**	Adobe Photoshop, Adobe Indesign, Adobe Acrobat
1132	**Marketing and sales directors**	Google Analytics, content development, social media platforms
2135	**IT business analysts, architects and systems designers**	HTML5, information architecture, Google Analytics
1136	**Information technology and telecommunications directors**	Front-end development, content development, information architecture
5449	**Other skilled trades n.e.c.**	Linkedin, residential design
5442	**Furniture makers and other craft woodworkers**	Residential design
5211	**Smiths and forge workers**	–
5441	**Glass and ceramics makers, decorators and finishers**	–

Note: Some of the occupations listed in the table have low proportion of 'createch' skills despite generally requiring advanced digital skills. These include IT business analysts, architects and systems designers and Information technology and telecommunications directors.

Endnotes

1. See Burning Glass's report for the Department of Digital, Culture, Media and Sport No Longer Optional: Employer Demand for Digital Skills for a detailed study of digital skills needs in the UK workforce.

2. SOC Codes relating to Creative Occupations can be found in Tables 56-59 of 'DCMS Sector Economic Estimates 2018: Employment.' DCMS, June 2019. https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2018-employment

3. Bakhshi, H., Downing, J., Osborne, M. and Schneider, P. (2017). The Future of Skills: Employment in 2030. London: Pearson and Nesta.

4. This is not always the case: the draft Welsh Curriculum 2022 expressly sets out to incentivise creativity and digital competence in all subjects.

5. Insights from our Industry Champions: The Value of Creative Higher and Further Education. https://www.pec.ac.uk/policy-briefings/insights-from-our-industry-champions-the-value-of-creative-higher-and-further-education

The Creative Industries Policy and Evidence Centre (PEC) works to support the growth of the UK's Creative Industries through the production of independent and authoritative evidence and policy advice.

Led by Nesta and funded by the Arts and Humanities Research Council as part of the UK Government's Industrial Strategy, the Centre comprises of a consortium of universities from across the UK (Birmingham; Cardiff; Edinburgh; Glasgow; Work Foundation at Lancaster University; LSE; Manchester; Newcastle; Sussex; Ulster). The PEC works with a diverse range of industry partners including the Creative Industries Federation.

For more details visit **www.pec.ac.uk** and **@CreativePEC**

If you'd like this publication in an alternative format such as Braille, large print or audio, please contact us at: **enquiries@pec.ac.uk**

Creative Industries
Policy & Evidence Centre

Led by **nesta**

PEC Policy Unit
58 Victoria Embankment
London EC4Y 0DS

+44 (0)20 7438 2500

enquiries@pec.ac.uk

@CreativePEC

www.pec.ac.uk