An exploratory study of the FinTech (Financial Technology) education and retraining in UK

Sung, A., Leong, K., Sironi, P., O’Reilly, T., McMillan, A

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An exploratory study of the FinTech (Financial Technology) education and retraining in UK

Anna Sung and Kelvin Leong
Chester Business School, University of Chester, Chester, UK
Paolo Sironi
IBM Industry Academy, Apopka, Florida, USA
Tim O’Reilly
Sage Qualifications, Leicester, UK, and
Alison McMillan
Glyndwr University, Wrexham, UK

Abstract
Purpose – The purpose of this paper is to explore two identified knowledge gaps: first, the identification and analysis of online searching trends for Financial Technology (FinTech)-related jobs and education information in UK, and second to assess the current strength of the FinTech-related job distribution in terms of job titles and locations in UK, job market in UK and what is required to help it to grow.

Design/methodology/approach – Two sets of data were used in this study in order to fill the two identified knowledge gaps. First, six years’ worth of data, for the period from September 2012 to August 2018 was collected from Google Trends. This was in the form of search term keyword text. The hypothesis was designed correspondingly, and the results were reviewed and evaluated using a relevant statistical tool. Second, relevant data were extracted from the “Indeed” website (www.indeed.co.uk) by means of a simple VBA programme written in Excel. In total, the textual data for 500 job advertisements, including the keyword “FinTech”, were downloaded from that website.

Findings – The authors found that there was a continuously increasing trend in the use of the keyword “fintech” under the category “Jobs and Education” in online searching from September 2012 to August 2018. The authors demonstrated that this trend was statistically significant. In contrast, the trends for searches using both “finance” and “accounting” were slightly decreased over the same period. Furthermore, the authors identified the geographic distribution of the fintech-related jobs in the UK. In regard to job titles, the authors discovered that “manager” was the most frequently searched term, followed by “developer” and “engineer”.

Research limitations/implications – Educators could use this research as a reference in the development of the portfolio of their courses. In addition, the findings from this study could also enable potential participants to reflect on their career development. It is worth noting that the motivations for carrying out an internet search are complex, and each of these needs to be understood. There are many factors that would affect how an information seeker would behave with the obtained information. More work is still needed in order to encourage more people to enter to the FinTech sector.

Originality/value – In the planning stage prior to launching a new course educators often need to justify the market need: this analysis could provide a supporting rationale and enable a new course to launch more quickly. Consequently, the pipeline of talent supply to the sector would also be benefitted. The authors believe this is the first time that a study like this had been conducted to explore specifically the availability and opportunities for FinTech education and retraining in UK. The authors anticipate that this study will become the primary reference for researchers, educators and policy makers engaged in future research or practical applications on related topics.

Keywords FinTech, Financial Technology, Higher education, Retraining, Business innovation

Paper type Research paper

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1. Introduction
Financial Technology (FinTech) is a cross-disciplinary subject that combines Finance, Technology Management and Innovation Management. FinTech initiatives often lead to new business models or even new business (Leong and Sung, 2018).

FinTech is a promising area in the business world. As per Pollari and Ruddenklau (2018), Global fintech funding rose to $111.8bn (£88.2bn) in 2018, which is an increase of 120 per cent when compared to $50.8bn (£40.08bn) in 2017. According to Gulamhuseinwala et al. (2017), 222 FinTech companies had received an average investment of £15m or £2.9bn in aggregate globally in the years up to 2017.

Researchers have also studied the intentions of users when changing their domestic currency for a digital currency (Glaser et al., 2014), and discussed whether Bitcoin would become a major currency (Luther and White, 2014). In the real market, the total crypto-currency market capitalization has increased more than three times since early 2016, reaching nearly $25bn in March 2017 (Hileman and Rauchs, 2017).

Financial technology companies are developing everywhere, especially in the payments market (McKinsey & Company, 2016). According to Zion market research (2018), the global mobile phone payment technology market is expected to reach a value of approximately £2,660.87bn by 2024.

The development of Fintech capabilities and related technologies has also facilitated the emergence of start-ups that offer alternative sources of financial service (Fenwick et al., 2017). Zhang et al. (2018) found that the total value of the alternative finance market in the UK grew by 35 per cent to £6.2bn during 2017. Crowdfunding is such a type of alternative method of generating finance and the total global crowdfunding industry was equivalent to GBP 27bn in 2015, that is, 2.1 times higher than the figure for 2014 (Massolution, 2015).

UK is one of the leading countries in the World in terms of FinTech development. In August 2014, Chancellor of the Exchequer, George Osborne, announced the UK Government’s ambition to make UK the “global capital of FinTech” (Kotecha, 2016). According to Ben et al. (2018), London is the number one pioneer in regulation, one of the top three in the ecosystem, and ranked third in market value among the global FinTech hubs. In addition, as at April 2019, there are more than 1,600 FinTech firms registered as businesses in the UK, and estimates that this will be more than double by 2030 (Helm et al., 2019).

As a result of the increasing investment in the UK, Innovate Finance (2015) estimated that the FinTech sector would help to create an additional 100,000 jobs in the UK by 2020. On the other hand, in conjunction with WPI Economics, Innovate Finance published a research report in April 2018 which suggested the UK FinTech workforce is set to double, in line with the expansion of the sector to include approximately 3,300 firms by 2030 (Oakley et al., 2018).

The rest of the paper is organised as follows. Building on the selected literature reviewed in Section 1, we identify the research gaps in the sector and discuss the potential impacts of the gaps in Section 2. In Section 3, we explain the research design and related background. The findings of the analyses are reported in Section 4. Section 5 provides discussions and recommendations for future works.

2. Research gaps in the sector
Although the emergence and development of FinTech and the demand for FinTech talents and skills have widely been studied nationally and internationally as introduced in Section 1, there has been little investigation into the interests of information seekers regarding FinTech-related jobs and education. This topic and related analysis is important for the health of this growing sector, where the increased demand for skills must be met, as well as for the educators who want to launch corresponding education and training programmes in the sector. For example, in the planning stage prior to launching a new course, educators need to demonstrate the market requirement and to make a business case of the development costs of that course.
Without such analysis as a support, the launch of new courses would be delayed and consequently, the pipeline of talent supply to the sector would be affected.

In addition, only very few studies have been conducted in regard to the job and skillset needs related to FinTech. Although there was a report (Gulamhuseinwala et al., 2017) indicating that attracting suitable and qualified talent is one of the top three challenges for the industry, with access to coding and software skills being of particular concern, the findings were limited to feedback obtained from UK FinTech firms only. In other words, the findings did not include opinion obtained from non-FinTech firms. Given that FinTech is an aspect that applies to every business (Leong and Sung, 2018), we considered that a broader study was needed to fill the knowledge gap. In fact, the understanding of the job market could help educators to equip future talents more appropriately to fulfil the range of needs within the broader sector.

This study aims to fill the two knowledge gaps identified above, they are:

1. Online searching trends for FinTech-related jobs and education information in UK.
2. FinTech-related job distribution in terms of job titles and locations in UK.

The research design is discussed in following section.

3. Research design

In this study, we used a public accessible online tool, Google Trends (www.google.com/trends/) to analyse the online searching trends on FinTech-related jobs and education information (research gap (1)).

Google Trends is a free public web service developed by Google. It shows how often specific search terms have been queried over a specific period of time. A search term is a keyword that a user enters the Google search engine to satisfy his or her information needs. The data provided by Google Trends is updated daily and it is possible to query up to five search terms simultaneously according to the predefined time period and geographical location.

Google Trends has been considered as a source of big data and the data from Google Trends has been used by researchers for analysing human behaviour and user interests across various fields (Jun et al., 2018). For example, Ginsberg et al. (2009) published their findings in Nature and reported that they successfully used the data from Google Trends to predict the spread of influenza epidemics – even earlier than the Centers for Disease Control and Prevention. Choi and Varian (2012) demonstrated how to use search engine data on Google to forecast near-term values of economic indicators, such as unemployment claims, consumer confidence, etc. The works of Vosen and Schmidt (2011) suggested that incorporating information from Google Trends could offer significant benefits to forecasters of private consumption. Durmusoglu (2017) demonstrated the uses of Google trends data to assess public understanding on the environmental risks.

On the other hand, in order to understand FinTech-related job distribution in terms of job titles and locations in UK (research gap (2)), we used an online data extraction technique called “web scraping” approach to extract the open data from the job posts on Indeed (www.indeed.co.uk). According to the official information from Indeed, this website is one of the most popular job sites in the world with over 250m unique visitors every month. A simple VBA programme written in Excel was used for scraping textual data for 500 job advertisements on indeed, with the keyword “FinTech”.

In fact, using web scraping to collect online open data can help to generate new knowledge. For example, by combining web scraping and analysing skill, Boeing and Waddell (2017) reported new Insights into Rental Housing Markets across the USA.
4. The results of analyses
Two analyses were conducted in this study as follows.

4.1 On analysing online searching trends on FinTech-related jobs and education information in UK
In this study, 6 years (from September 2012 to August 2018) of search terms (i.e. keywords) data were collected from Google Trends. More specifically, the search terms were “fintech”, “finance” and “accounting”. By specifying the category “Jobs and Education” in Google Trends, we filtered the results to specified category (i.e. Jobs and Education) only and enhancing the accuracy of analysing results. It is worth mentioning that the data collected from Google Trend in this research is NOT about job advertisement in the finance related positions. Instead, the data collected refers to the search behaviour of Google search engine users, that is, what these users are looking for over a specified period and the location of the search was conducted. More specifically, in this case, the data refers to how frequent (search volume) Google users in the UK used specified keywords (i.e. “fintech”, “finance” and “accounting”) to search jobs and education related information.

Figures 1 to 3 demonstrate the “search volume indexes” of the terms “fintech”, “finance” and “accounting” from September 2012 to August 2018, respectively. For these figures, the horizontal axis represents time, and the number at the vertical axis is the “search volume index”. The index represents search interest relative to the highest point on the chart for the given region (i.e. UK in this study) and time (i.e. from September 2012 to August 2018 in this study). A value of 100 is the peak popularity for the term, while a score of 0 means there was not any search for the term.

As per Figure 1, the trendline in the chart of “fintech” illustrated the left-hand side (more earlier in terms of timeline) is much lower than the right-hand side (more recent in terms of timeline), this indicates an increasing trend for the search term “fintech”. In contrast, both the trendlines in the charts of “finance” and “accounting” (Figures 2 and 3) illustrated the
left-hand sides (more earlier in terms of timeline) are slightly higher than the right-hand sides (more recent in terms of timeline), that means the overall search volume of both terms “finance” and “accounting” had been dropped slightly during the same period. These patterns demonstrate that there has been an evolution in the search terms used for fintech-related jobs and educations in the UK.

Figure 4 shows the “accumulated search volume indexes” of the terms “fintech”, “finance” and “accounting” during the periods from Sep 2012 to Aug 2014 (in red), from September 2014 to August 2016 (in yellow) and from September 2016 to August 2018 (in green).

In Figure 4, we observed obvious changes of searching patterns for the term “fintech”. The increasing trend of searching pattern reflects how UK’s Google users’ behave in response to the impacts of FinTech on financial industry. Previous studies have found strong association between online searching behaviour and various social topics in the real world, such as flu prevention (Ginsberg et al. 2009), investor attention and IPO anomalies (Song et al., 2011), forecasting of cinema visits (Hand and Judge, 2012), etc. Recent years, FinTech is an emerging topic and is changing the financial ecosystem. For examples, Gomber et al. (2017) had indicated that financial industry has experienced a continuous evolution due to digitalization. Lee and Shin (2018) explained that FinTech is a disruptive innovation capable of shaking up traditional financial markets while Romanova and Kudinska (2016) further explained the rapid rise of FinTech has changed the business landscape in banking. Moreover, Chuen et al. (2015) suggested that FinTech will define and shape the future of the financial services industry, and at the same time, increase participation. According to the findings of Gulamhuseinwala et al. (2015), 15.5 per cent of digitally active consumers are using FinTech products. Furthermore, Chen (2016) suggested that FinTech facilities the integration between finance and real-life needs.
In overall, the changes of financial ecosystem lead to increasing demand of related information need through internet, consequently, the demand drives an increasing trend of search patterns for the term “fintech”. In order to evaluate if the change is significant. We, therefore, hypothesize:

**H1.** The online searching volume of FinTech-related jobs and education information had changed significantly in UK.

As mentioned previously in this paper, the Chancellor of the Exchequer, George Osborne, announced the UK Government’s ambition to make the UK the “global capital of FinTech” (Kotecha, 2016) in August 2014. Therefore, three periods (i.e. red, yellow and green) were used to represent 3 different stages related to the announcement: Stage 1 is the period from Sep 2012 to Aug 2014 (in red), referring to the two-year period “before” the announcement. Stage 2 is the period from September 2014 to August 2016 (in yellow); it indicates the two-year period “after” the announcement. A comparison between Stage 1 and Stage 2 shows the changes of search volumes on corresponding terms before and after the announcement. In brief, the search volume of “fintech” had increased from 58 to 532 (817 per cent increase) from Stage 1 to Stage 2; however, the search volumes of the other two terms, “finance” and “accounting”, were constant. Moreover, Stage 3, the period from September 2016 to August 2018 (in green), represents the “follow-up” two-year period after Stage 2. It reflects another increase from 532 to 1,462 (175 per cent increase) of search volume from Stage 2 to Stage 3, indicating that this growth is continuous instead of one-off.

Recall that in H1, we proposed “the online searching volume of FinTech-related jobs and education information had changed significantly in UK”. We then suggested the null hypothesis (i.e. the expectation) as opposite situation, that is:

**H0.** The online searching volume of FinTech-related jobs and education information had not increased significantly in UK.

For each comparison, we applied $\chi^2$ test as statistical test to determine if there is a significant difference between observed and expected frequencies. The expected frequency of the stage at each comparison is evenly distributed between two stages, that is, assuming there is no change from one stage to another.

According to the $\chi^2$ test results, as presented in Tables I and II, we found statistical significance results of the changes between Stages 1 and 2 ($\chi^2 = 227.038$, $p < 0.01$) and between Stages 2 and 3 ($\chi^2 = 229.348$, $p < 0.01$) (df = 1). Therefore, the null hypothesis, $H_0$, for both tests should be rejected. These results support the conclusion that the search volume of FinTech-related jobs and education information had increased significantly in the UK.

### 4.2 On analysing FinTech-related job distribution in terms of job titles and locations in UK

The Indeed website contains textual information about job vacancies; see, for example, Figure 5. For this research, we analysed 500 job titles, and their corresponding locations, which included the keyword “FinTech”.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Observed</th>
<th>Expected</th>
<th>$\chi^2$ component $(O_i - E_i)^2/E_i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>From September 2012 to August 2014</td>
<td>58</td>
<td>295</td>
<td>190.40</td>
</tr>
<tr>
<td>From September 2014 to August 2016</td>
<td>532</td>
<td>295</td>
<td>190.40</td>
</tr>
<tr>
<td>Total</td>
<td>590</td>
<td>590</td>
<td>380.81</td>
</tr>
</tbody>
</table>

**Notes:** The $\chi^2$ statistic is 227.038. The $p$-value is 0.0000
A simple VBA programme was written on Excel in order to extract the relevant data from Indeed website.

We executed the programme on 11 June 2019, 12.39 p.m. We found that the majority of the jobs were located in London (63 per cent). Table III summaries the top 10 locations of the jobs and Figure 6 is a colour gradient heat map that shows the distribution of the jobs in which red refers to having highest density of jobs, followed by yellow and then green. Table III and Figure 6 reflect the FinTech-related job opportunities across UK, and therefore this can inform job seekers as to where there is greater demand for FinTech-related jobs available.

In addition, we also conducted a textual analysis to evaluate which keywords are most likely to be used in the job titles. After excluding the punctuation marks, and transition words (e.g. “and”), we identified the 20 most frequent keywords, shown in Table IV. This information could be used as a reference for various purposes in education and training.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Observed $O_i$</th>
<th>Expected $E_i$</th>
<th>$\chi^2$ component $\frac{(O_i - E_i)^2}{E_i}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>From September 2014 to August 2016</td>
<td>532</td>
<td>997</td>
<td>216.88</td>
</tr>
<tr>
<td>From September 2016 to August 2018</td>
<td>1,462</td>
<td>997</td>
<td>216.88</td>
</tr>
<tr>
<td>Total</td>
<td>1,994</td>
<td>1994</td>
<td>433.75</td>
</tr>
</tbody>
</table>

Notes: The $\chi^2$ statistic is 229.348. The $p$-value is 0.0000
For example, taking note of the fact that “manager”, “developer” and “engineer” are the top three most frequent keywords, an educator might include a greater content of management or coding skills in the curriculum of related courses, in order to meet the market needs.

5. Discussion and recommendations for future works
Digital transformation is changing many industries all over the world in different ways, such as health (Agarwal et al., 2010), policing (Wall and Williams, 2007), crime prevention (Leong and Chan, 2013), marketing (Mulhern, 2009), product life-cycle management (McMillan et al., 2017), etc. In financial industry, Fintech has disrupted and is disrupting the whole industry. Particularly, it has significant impacts on the related job market.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Location</th>
<th>Counts</th>
<th>% (out of 500)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>London</td>
<td>315</td>
<td>63</td>
</tr>
<tr>
<td>2</td>
<td>Reading</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Cardiff</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Farringdon</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Belfast</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Edinburgh</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Liverpool</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Manchester</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Fareham</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Slough</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

Table III. Fintech Job distribution by location

Source: Google Maps

Figure 6. FinTech job distribution in the UK
For example, Vikram Pandit (former Citigroup Chief) predicted that 30 per cent of banking jobs could be wiped out by Artificial Intelligence (AI) in five years (Chanjaroen, 2017), while Mizuho Financial Group in Japan says it will use AI to replace 19,000 people by 2027 – about a third of its workforce (Gopalan, 2019). On the other hand, as per Helm et al., (2019), there were 76,500 people working in FinTech UK-wide, but the number is set to grow to 105,500 by 2030.

Therefore, there are emerging requirements for developing the education and retraining sector for existing and potential finance participators.

In this paper, we have evaluated 6 years (from September 2012 to August 2018) of search terms (i.e. keywords) data from Google Trends and identified continuous increasing searching trends of the keyword “fintech” under the category “Jobs and Education”. Over the same period, both the searching trends of “finance” and “accounting” were slightly decreased. Moreover, we found that the increasing searching patterns of the keyword “fintech” were statistically significant. These findings could serve as a reference for educators when they consider the portfolio of their courses.

In addition, the findings of the geographic distribution of the fintech-related jobs could be used by related educators when they plan job placement arrangements in their courses. Moreover, by analysing the job titles of 500 job FinTech posts on indeed website, we demonstrated that “manager” was the most frequently used term among job titles, followed by “developer” and “engineer”. These findings not only provide some insights to educators on designing curriculum, but also enable potential participators to reflect their career development.

It is worth noting that gaining the understanding of the motivation of internet searching is subjected to complexity. Moreover, there are many factors would affect how an information seeker would behave with the obtained information. More works are still needed in order to encourage more people to enter to the FinTech sector. Replication studies with larger samples and in different cultural settings could provide more relevant insights.

In summary, we believe this is the first time that a study like this had been conducted to specifically review online searching trends for FinTech related jobs and education information in UK and FinTech related job distribution in terms of job titles and locations.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Keywords</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manager</td>
<td>84</td>
</tr>
<tr>
<td>2</td>
<td>DEVELOPER</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>Engineer</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>Fintech</td>
<td>71</td>
</tr>
<tr>
<td>5</td>
<td>Senior</td>
<td>70</td>
</tr>
<tr>
<td>6</td>
<td>Business</td>
<td>41</td>
</tr>
<tr>
<td>7</td>
<td>Analyst</td>
<td>40</td>
</tr>
<tr>
<td>8</td>
<td>Data</td>
<td>29</td>
</tr>
<tr>
<td>9</td>
<td>Software</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>Java</td>
<td>27</td>
</tr>
<tr>
<td>11</td>
<td>Lead</td>
<td>26</td>
</tr>
<tr>
<td>12</td>
<td>Sales</td>
<td>24</td>
</tr>
<tr>
<td>13</td>
<td>Product</td>
<td>24</td>
</tr>
<tr>
<td>14</td>
<td>Development</td>
<td>24</td>
</tr>
<tr>
<td>15</td>
<td>Executive</td>
<td>23</td>
</tr>
<tr>
<td>16</td>
<td>Support</td>
<td>20</td>
</tr>
<tr>
<td>17</td>
<td>Marketing</td>
<td>20</td>
</tr>
<tr>
<td>18</td>
<td>DevOps</td>
<td>20</td>
</tr>
<tr>
<td>19</td>
<td>Customer</td>
<td>18</td>
</tr>
<tr>
<td>20</td>
<td>Financial</td>
<td>17</td>
</tr>
</tbody>
</table>

Table IV. Most frequent keywords among FinTech job titles
Hopefully, the work reported in this paper will be used as a primary reference for researchers, education management and policy makers for future research or practical applications on related topic.

References


Corresponding author
Anna Sung can be contacted at: a.sung@chester.ac.uk