Employment and Career Prospects of Technical-Oriented Jobs in the FinTech Market

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ABSTRACT

FinTech refers to a set of new technologies employed to improve and automate the delivery and use of financial services. This study aims to provide some insightful information to: (a) universities on how to offer their FinTech education, and (b) graduates so that they can make an informed decision on whether they should start their FinTech career journey. To achieve these aims, we explore the credentials of recent and long-time graduates who are working in the FinTech area by conducting a questionnaire survey involving 48 Australian FinTech companies and 83 FinTech practitioners working in various IT functions of these companies. Among the various findings reported in this paper, some of them are: (a) the most straightforward way to start the "technical-oriented" FinTech career is to earn an undergraduate IT degree, (b) possessing previous IT work experience is almost a norm for FinTech practitioners, and (c) for those FinTech practitioners with previous work experience in financial services, they may have a higher chance to be promoted to executives.

Keywords: Business innovation, Disruptive technology, Financial technology, Fintech, Employment

1. INTRODUCTION

In the past decade, we have witnessed how technology has transformed the financial services industry, covering various areas such as banking, lending, payment, insurance, and asset management (Alaassar et al., 2023; El-Masri et al., 2019; FSDC, 2022; Lagna & Ravishankar, 2022). Today, Financial Technology (FinTech) has gained widespread popularity, especially in the financial services and information technology (IT)/information systems (IS) industries. (In the rest of this paper, we will not differentiate between IT and IS.) In response to the popularity of FinTech, a growing number of talented people and employees are being drawn away from investment banks and are eager to start the FinTech career journey (Cousins, 2022).

Because FinTech is at the intersection between financial services and technology, people generally believe that most existing FinTech practitioners possess a background in finance, banking, or technology in terms of academic qualification and/or work experience (this conjecture will be examined in our study discussed below). The rise of FinTech indeed requires the next generation of financial or IT professionals to possess an even broader and interdisciplinary range of skills (Berkeley Extension, n.d.).

This paper discusses our recent survey study with the main objective of exploring some insightful information on the credentials of recent and long-time graduates who are working in the FinTech area. This information provides some hints to universities about how to offer their FinTech education, and facilitates graduates to make an informed decision on the chance of successfully starting their FinTech career journey. To avoid verbosity, for the rest of this paper, whenever we say "FinTech career (or jobs)," we mean "IT-related FinTech career (or jobs)."

The rest of the paper is structured as follows. Section 2 gives a literature review on the history and development of FinTech, and discusses the implications of FinTech from the university's and graduate's perspectives. Section 3 discusses the responses of universities and graduates to the growing popularity of FinTech. Section 4 introduces our research objective and questions. Section 5 describes our study methodology and setup. Section 6 then discusses the survey results, together with our interpretation and analysis. Section 7 discusses the related work and highlights the contribution of this paper. Section 8 outlines the major limitations of our study. Finally, Section 9 summarizes and concludes this paper.

2. LITERATURE REVIEW

2.1 History and Development of FinTech

FinTech is a buzzword that refers to a set of new technologies employed to improve and automate the delivery and use of financial services (Kagan, 2023). As such, FinTech differs from IT — the latter is not restricted to the financial sector only. According to Google Trends, it was only in 2014 that this buzzword emerged on a "broad scale" and the transformation of the financial services industry by FinTech became more visible (Arner et al., 2016). Using specialized software and algorithms implemented on various devices such as computers and smartphones, FinTech helps companies and consumers better manage their financial operations and processes. FinTech aims to unbundle offerings by "traditional" financial services companies and create new markets for them. Examples of FinTech applications are robo-advisers, payment apps, peer-to-peer (P2P) lending apps, investment apps, cryptocurrency and digital cash, smart contracts, and crowd funding (Kagan, 2023; Paul & Sadath, 2021).

Basically, the evolution of FinTech can be categorized into the following three eras (Alt et al., 2018):

- **Era 1 (based on physical media):** This era was roughly between 1500 and 1860, and it started even before the emergence of financial institutions. In this era, financial services and trading relied on physical media containing information and/or value (e.g., paper documents and coins). Since transferring these physical media was only feasible via physical modes of transportation, markets were mainly limited to a regional scope.
- **Era 2 (based on analog technologies):** This era was roughly between 1860 and 1960. Analog technologies, such as the visual and later the electrical telegraph, made it possible to separate information from its physical representation so that information could be transmitted across both continents and oceans almost instantly. Analog technologies (especially the telegraph) were argued to be a major factor contributing to modern industrialization (Lew & Cater, 2006).
- **Era 3 (based on digital technologies):** This era roughly started from 1960 and is still continuing. It involves two phases: (a) banking IT (between 1960–2008) and (b) FinTech (from 2008 to present). In this era, financial services have largely become a digital industry that rely heavily on electronic transactions between financial institutions, financial-market participants, and customers around the world (Arner et al., 2016). At about the same time as the global financial crisis in 2008, the FinTech movement started, with

characteristics such as: (i) an increasing pace of diffusion of innovative downstream IT solutions, (ii) an emergence of non-banks and new start-up businesses offering "focused" financial services, and (iii) a changing behavior of banking customers towards online banking.

2.2 Curriculum Design, University Selection, and Career Selection

In today's business environment, university graduates enter an increasingly volatile job market (in terms of recruitment or employment). (Lichau (2022) argues that FinTech is also a highly volatile market.) This phenomenon creates implications for curriculum/course design from the university's perspective and has implications for university and career selection from the graduates' perspectives.

- **University's perspective:** Because many employers adopt the "skills-first hiring" recruitment approach (THE, 2023), universities have an important mission to equip their graduates with the necessary skills and knowledge so that graduates can meet the industry's expectations. Now we turn to the specific context of IT. Elrod et al. (2022) argued that IT programs should be developed to prepare graduates to create innovative solutions for problems where business and technology intersect. (Note that FinTech is an interdisciplinary area between finance and IT). Downey et al. (2008) emphasized that an IT degree should incorporate business fundamentals and prepare graduates for the key roles of managing people and technology in business organizations. Case et al. (2019) suggested that universities should use digital disruption (e.g., FinTech) as a "fundamental and powerful concept" in designing their IT curricula, thereby making these curricula more appealing and relevant to students and other stakeholders. Doherty and Stephens (2023) argued that the pace of technology-driven changes in the FinTech sector poses significant challenges for the alignment between the skill needs of industry and skills provision by universities.
- **Graduate's perspective:** Thomas (2014) conducted a survey and reported that in a tough job market, students' choice of university is largely influenced by future employment/job prospects. More specifically, this survey found that 62% of the graduates would consider the employment/job prospects when choosing their preferred universities and programs. Fredonia (n.d.) observed that most graduates would perform a "self-assessment" exercise before applying for jobs. In this assessment, with reference to their general talents/strengths and specific domain knowledge acquired through university education, graduates would thoroughly research and make a career decision (often within or close to the broad discipline of their studies).

3. RESPONSES OF UNIVERSITIES AND GRADUATES TO FINTECH

Following the popularity of FinTech, some universities have tapped into the FinTech landscape by offering programs or courses (undergraduate and postgraduate) to educate their graduates with the relevant knowledge so that these graduates

have a higher chance of successfully breaking into the FinTech job market. In doing s0, universities should understand the key aspects that influence this chance of success.

From the graduate's (particularly IT graduate's) perspective, they may attempt to find a technical-oriented FinTech job after completing their studies. In the broad technically-oriented discipline, there are many different types of "traditional" IT jobs (e.g., business analysis, computer programming, software development, software testing, technical support, computer networking, and database administration) as well as those that are more emerging, innovative, and closely related to FinTech (e.g., financial app and platform development). In many cases, whether IT graduates will apply for a FinTech-related IT job will partly depend on their "self-assessment" of the expected chance of successfully getting the job based on their credentials (e.g., education, training, skills, and competencies) (Özbilgin et al., 2005; Purohit et al., 2021). To facilitate better "self-assessment," these graduates are eager to know any relevant information that helps them make an informed choice on whether they should start their FinTech journey.

4. RESEARCH OBJECTIVE AND QUESTIONS

In view of the university's and graduate's responses to FinTech mentioned in Section 3, we conducted a survey with the main objective of exploring some insightful information on the credentials of recent and long-time graduates who are working in the FinTech area. Our study focused only on those graduates whose jobs are directly related to FinTech rather than those in supporting roles (e.g., accounting, finance, human resources, customer relations, and investment) of a FinTech company.

In view of this objective, we formulated the main research question as follows: ***"What are the factors that contribute to FinTech practitioner skills?"*** This research question was decomposed into the following subquestions:

- ***RQ1:*** What are the typical education levels and disciplines of FinTech practitioners?
- ***RQ2:*** Do FinTech practitioners typically possess FinTech-related professional qualifications and formal training?
- ***RQ3:*** How soon do FinTech practitioners enter this career after completing their *highest* academic qualifications?
- ***RQ4:*** What were the previous work backgrounds of FinTech practitioners before starting their *first* FinTech jobs?
- ***RQ5:*** Is it common for FinTech practitioners to have previous work experience in the financial services industry?

Table 1 below summarizes the relevance of the above questions from the university's and graduate's perspectives.

Research questions	University's perspective	Graduate's perspective
RQ1	• Universities want to know whether undergraduate and postgraduate programs are in demand (or sufficient) for the FinTech career. • Universities want to know which disciplines (e.g., IT, finance, or accounting) are in demand for the FinTech career.	• With their degrees, graduates want to know how likely they can break into the FinTech job market. • Graduates want to know whether a *postgraduate* degree is a typical qualification for successfully entering the FinTech job market.
RQ2	• Universities want to know whether they should offer short-term FinTech-related professional/ executive training courses (often non-credit bearing) in addition to their degree programs.	• Graduates want to know whether they need to acquire FinTech-related professional qualifications and receive formal training for starting and continuing the FinTech career.
RQ3		• Graduates need this information for planning their career paths to the FinTech profession.
RQ4		• Graduates need this information for planning their career paths to the FinTech profession.
RQ5	• Universities want to know whether their finance or financial services degree programs are in demand for the FinTech career. This is because FinTech practitioners with previous work experience in the financial services industry might have graduated with a degree in finance or financial services. • If finance or financial services degree programs are in demand for the FinTech career, universities need to revise the existing curricula of these programs to incorporate a FinTech component.	• Graduates need this information for planning their career paths to the FinTech profession.

Table 1. Relevance of the Five Research Questions With Respect to the University's and Graduate's Perspectives

5. STUDY METHODOLOGY AND SETUP

5.1 Choice of Methodology

Because our study was aimed at answering the five research questions listed in Section 4, the study methodology naturally leaned toward a survey consisting of both qualitative (e.g., RQ1: education levels and disciplines) and quantitative (e.g., RQ3: number of years to start the first FinTech job after completing the highest academic qualification) data. Glasow (2005) argued that surveys are well suited to gathering demographic data that describe the composition of the sample (in our case, FinTech practitioners). Among the various kinds of surveys, our study adopted a *cross-sectional survey* approach, which is a type of observational research that analyzes data across a sample population at a specific point in time for uncovering characteristics that exist among participants (Cherry, 2022; Mahmutovic, 2021). Cross-sectional surveys are commonly used in the education sector to measure the various attributes of graduates (e.g., Hou et al., 2016; Sun et al., 2022).

5.2 Study Setup

Because Australia has been an early adopter of financial services innovation and technology (Global Australia, n.d.), our survey was performed in an Australian context. Based on an online directory of over 1,000 firms that report themselves as FinTech companies operating in Australia (https://australianfintech.com.au/directory-all/), we performed the following three steps:

   a. We randomly selected a set of "candidate" FinTech companies.
   b. For each "candidate" company selected in (a), we verified whether it was a genuine FinTech company.
   c. For each genuine FinTech company in (b), we conducted a survey with *at most* two of its employees whose jobs are directly related to FinTech (these FinTech practitioners are hereafter simply referred to as "participants").

In step (b) above, we verified whether a "candidate" FinTech company is a genuine one by using the following definition: *A FinTech company is one that offers technologically enabled financial innovation, resulting in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services* (BIS, 2018).

If a "candidate" company fulfilled the above definition, it became a subject FinTech company (or simply a "subject company") for our further analysis. After completing step (b), 80 subject companies were selected.

In step (c) above, we chose at most two participants from each subject company. This choice was to address a major potential drawback of not limiting the number of participants per company. Our study involved some large, multinational, and "reputable" FinTech companies which recruit a large number of FinTech practitioners. These "reputable" FinTech companies are often more "attractive" to job applicants and, hence, have greater job competition. Consequently, those applicants who have successfully secured their jobs from these "reputable" FinTech companies will often possess better credentials (e.g., academic qualifications and previous work experience). If we did not limit the number of participants per company, it was possible that more participants of our study came from these "reputable" FinTech companies and, hence, created a false illusion that the credentials of a "typical" FinTech practitioner are much higher than the reality (considering all the FinTech companies as a whole).

The selected participants were broadly classified into the following three job levels in terms of seniority:

- *Senior:* This level covered job titles such as Chief Information Officer (CIO), Chief Technology Officer (CTO), Senior IT Director, and IT General Manager.
- *Middle:* This level covered job titles such as Software Development Manager, Lead/Principal/Senior Software Engineer, Principal Platform/Front-End Engineer, Senior Full Stack Engineer, Senior Cloud Developer, Senior IT Business Analyst, and Senior Solution Architect.
- *Entry:* This level covered job titles such as (Junior) Software Engineer, Full Stack Developer, Android/API (Application Programing Interface) Developer, .Net Developer, Web Developer, (Analyst) Programmer, UX (User Experience)/UI (User Interface) Designer, and Software Architect.

To widen our study scope in terms of job levels, if we selected two participants from the same subject company, they were from different job levels.

We sent out 200 questionnaires (see the Appendix for a simplified version) for information collection between December 2022 – January 2023. The returned questionnaires (after excluding those that were largely incomplete) involved 48 subject companies and 83 participants (the response rate was about 42%). Table 2 shows the breakdown of these subject companies with respect to their primary types of FinTech services (these types were based on the FinTech business models as discussed by Lee and Shin (2018)). Table 3 shows the breakdown of participants with respect to their job levels.

Primary types of FinTech services	Numbers of subject companies
App developers	23
Platform providers	13
Cryptocurrency brokers	4
Digital banks	3
P2P lenders	3
Money transfer providers	2

Table 2. Primary Types of FinTech Services

Job Levels:	Entry	Middle	Senior
Numbers of participants	31	31	21

Table 3. FinTech Participants' Job Levels

Based on the collected information, we computed the relevant descriptive statistics for addressing the five research questions listed in Section 4.

6. SURVEY RESULTS, INTERPRETATION, AND ANALYSIS

6.1 RQ1: Education Level and Discipline

We first counted the number of participants *with* a degree (from any discipline) in each job level. The counts were 31 (entry-level: out of 31, 100.0%), 29 (middle-level: out of 31, 93.5%), and 19 (senior-level: out of 21, 90.5%). Overall, the statistics show that a degree is almost an "entry ticket" into the FinTech career at all job levels. The percentage of non-degree holders increased from entry (0.0%) through middle (6.5%) to senior (9.5%). This might be explained by the participants' mean numbers of years of work experience: 9.1 years (entry), 15.5 years (middle), and 21.2 years (senior). On average, senior-level participants entered the workforce more than two decades ago. At that time, it was still possible, although the chance was not high, for a non-degree holder to secure a "professional" job, because the industry's demand for degree holders was not as high as today. On the other hand, entry-level participants entered the workforce more recently where it became almost a mandatory requirement for job seekers looking for "professional" jobs to hold a degree.

Now we dwell further down into the details of participants with and without an IT degree. Examples of an IT degree are those that cover disciplines such as computer science, software engineering, information technology, information systems, computer networking, and cybersecurity. Table 4 shows the numbers and percentages of participants with and without an IT degree (undergraduate (Ugrad) or postgraduate (Pgrad)) at each level. Among all the participants with a postgraduate IT degree, only one of them has an IT degree at the Ph.D. level. All the remaining ones have an IT master's degree. Table 5 shows, among all the degree-holding participants, the numbers and percentages of those with *at least* one IT degree and those with none. In Table 5, the participants could be classified into the following four categories:

- Those with an undergraduate IT degree and a postgraduate IT degree;
- Those whose IT degrees are at the undergraduate level only;
- Those whose IT degrees are at the postgraduate level only; and
- Those without any undergraduate or postgraduate IT degrees.

Tables 4 and 5 provide two important messages to those who desire to start their FinTech career:

- One may argue that the percentage of participants with a postgraduate IT degree must not be larger than those with an undergraduate IT degree, because an undergraduate IT degree is often a prerequisite for studying a postgraduate IT degree. However, in Table 4, the range of percentages ([66.7%, 80.6%]) for FinTech practitioners with an undergraduate IT degree is much larger than the range of percentages ([9.5%, 29.0%]) for those with a postgraduate IT degree. Thus, we can still reasonably conclude that it is more common for FinTech practitioners to have an undergraduate IT degree only than to have a postgraduate IT degree.
- Most FinTech practitioners have at least one IT degree (range of percentages = [73.7%, 89.7%]). Some studies (e.g., Andersson, 2023) reported that, other than an IT degree, studying business, economics, or finance degrees is an alternative path to start the FinTech career. Table 5, however, shows that, although this alternative path is feasible, having an IT degree is the most popular (and possibly the most straightforward) option for entering the FinTech job market (at least in Australia).

6.2 RQ2: FinTech-Related Professional Qualifications and Formal Training

Besides university education, other possible ways to acquire FinTech knowledge and skills (e.g., blockchain and cybersecurity, app development and programming, artificial intelligence (AI) and machine learning, cloud computing, data science/analytics, and compliance (Harper, n.d.; UNSW, 2022)) are through professional qualifications (e.g., the Chartered Fintech Professional (CFtP) qualification by Global FinTech Institute) and formal training (e.g., the 24-week professional FinTech course offered by Monash University in Australia).

According to our survey, very few participants have earned/received FinTech-related professional qualifications and formal (often external) training before or after starting their FinTech career. The numbers of such participants at the entry-level, middle-level, and senior-level were three (9.7%), three (9.7%), and zero (0.0%), respectively (see endnote 1). Table 4 shows that very few FinTech participants do not have a degree. This observation, together with the finding that very few participants have earned/received FinTech-related professional qualifications, indicate that earning certifications alone has not been widely developed as an "alternative" path for entering a FinTech career. For these six participants with professional qualifications and/or formal training in FinTech, the knowledge areas involved cloud computing, data science and big data, Python, and Bitcoin.

	Entry level (total = 31)		Middle level (total = 31)		Senior level (total = 21)	
	Ugrad [†]	Pgrad [‡]	Ugrad [†]	Pgrad [‡]	Ugrad [†]	Pgrad [‡]
IT degree	23 (74.2%)	6 (19.4%)	25 (80.6%)	9 (29.0%)	14 (66.7%)	2 (9.5%)
Non-IT degree	8 (25.8%)	1 (3.2%)	4 (12.9%)	3 (9.7%)	5 (23.8%)	5 (23.8%)
No degree	0 (0.0%)	24 (77.4%)	2 (6.5%)	19 (61.3%)	2 (9.5%)	14 (66.7%)

[†] These columns show the numbers & percentages of participants with an undergraduate degree. Some of these participants may also have a postgraduate degree.

[‡] These columns show the numbers & percentages of participants with both an undergraduate degree & a postgraduate degree (because an undergraduate degree is a prerequisite for studying a postgraduate degree).

Table 4. Graduation Level and Discipline

	Entry-level degree holders (total = 31)	Middle-level degree holders (total = 29)	Senior-level degree holders (total = 19)
At least one IT degree	24 (77.4%)	26 (89.7%)	14 (73.7%)
No IT degree	7 (22.6%)	3 (10.3%)	5 (26.3%)

Table 5. Participants With at Least One IT Degree and Those With None

In our survey, the majority of participants replied that, after graduation, they learned FinTech-related knowledge and skills "on the job." The following are three examples of participants' responses that explain why they have not received formal external training:

- *"Our company is just a startup with small revenue. The company is cutting down training expenses"* (from a senior-level participant of a platform provider).
- *"Our workload is high and our work pace is fast, so attending external training by leaving [our] work behind is not an option"* (from an entry-level participant of an app developer).
- *"In-house, on-the-job training is more relevant and cost-effective. External trainings are too generic; not specific enough for our knowledge needs"* (from a middle-level participant of a money-transfer provider).

6.3 RQ3: How Soon to Start the First FinTech Job After Earning the Highest Academic Qualification
We designed the questionnaire so that all time durations were expressed in *whole* years (see endnote 2) because: (a) some participants (especially those who are at the senior-level with a long history of work experience) might not be able to recall the "exact" duration, and (b) we aimed to increase the survey response rate by reducing the burden of answering the survey questions. For example, if the duration was two years and four months, it would be rounded down to two years. Table 6 shows the time durations for the participants to start their first FinTech jobs after earning their highest academic qualifications.

Note the following two observations from Table 6:

1. The mean numbers of years to start the first FinTech jobs increased from entry-level (4.7 years) through middle-level (9.7 years) to senior-level (14.7 years). Readers are cautioned not to interpret the time duration as the length of time for participants to *find* their first FinTech jobs. One possible reason is that some participants did not intend to find their first jobs in the FinTech area; rather, they started their FinTech career only some years after working in other non-FinTech areas. This was particularly the case for senior-level participants because at the time when they looked for their first jobs after graduation (recall that, on average, they have 21.2 years of work experience; see Section 6.1), FinTech was still at the infant stage and, hence, was not as popular or available as today. On the other hand, most entry-level participants graduated in the last decade (recall that, on average, they have 9.1 years of work experience; see Section 6.1) when FinTech has started to bloom and, hence, they were more eager to

look for FinTech jobs shortly (or immediately) after graduation.

2. Across all the three job levels, the minimum number of years to start the first FinTech job was zero (entry level: 8 out of 31, 25.8%; middle level: 2 out of 31; 6.5%; senior level: 1 out of 21, 4.8%). Readers are reminded again that the time duration was rounded up or down to the nearest whole year. Thus, zero-time duration may not necessarily mean that the relevant participants started their FinTech jobs *immediately* after completing their highest academic qualifications. The "actual" time duration could in fact be somewhere between one month and five months.

	Number of Years		
	Means	Ranges	Standard Deviation
Entry-level participants	4.7	0–21	6.3
Middle-level participants	9.7	0–21	6.8
Senior-level participants	14.7	0–31	8.3

Table 6. Number of Years to Start the First FinTech Job After Earning the Highest Academic Qualification

6.4 RQ4: Previous Work Background Before Starting the FinTech Career
For those participants whose first jobs were not in the FinTech area, we analyzed their previous work background before their FinTech career. We found that most of them had worked in various IT functions (e.g., software development and cloud development) before commencing their first FinTech jobs. On average, individuals at the entry, middle, and senior levels had 5.9 years, 11.6 years, and 14.2 years of previous IT work experience, respectively. (Here, previous IT work experience counted the number of years for a participant to work in IT-related functions in *non-FinTech companies*. A participant's work experience in FinTech companies, however, was not counted.) This observation complements the observation discussed in Section 6.1. Whereas Section 6.1 reports that most participants have at least one IT degree, this section further reports that most of them also had previous IT work experience.

We also noted that few (14 out of 83; = 16.9%) participants possessed previous work experience in non-IT areas as shown in Table 7. In this table: (a) each row corresponds to a different participant, and (b) only Participants 9 and 13 (indicated with an asterisk) do not have any previous IT work experience. On the other hand, the remaining 12 participants have some years of previous IT and non-IT work experiences. Table 7 indicates that it is not that popular for FinTech practitioners to have previous non-IT work experience (only 16.9%).

6.5 RQ5: Previous Work Experience in the Financial Industry
Since FinTech is an interdisciplinary area between financial services and technology, one may naturally wonder how many participants have previous work experience in the financial services industry. Table 8 provides some insight on this issue.

Participants	Non-IT work experiences (number of years)
Entry level:	
1	Risk management (1 year), business operations (5 years)
2	Quality assurance (1 year)
3	Marketing (3 years)
4	Accounting (1 year)
5	University tutoring (4 years)
Middle level:	
6	Banking operations (4 years)
7	Accounting (5 years)
8	Business operations (5 years)
9*	Business operations (8 years)
10	Mechanical engineering (3 years)
11	University's research assistant (12 years)
Senior level:	
12	Finance (26 years)
13*	Risk management (22 years), wealth management (3 years)
14	Sales (4 years)

Note: Some participants started their first jobs before completing their first degrees.

Table 7. Participants With Non-IT Work Experience Before Starting Their FinTech Career

In Section 6.1, it is stated that the mean numbers of years of work experience were 9.1 years, 15.5 years, and 21.2 years for the entry-, middle-, and senior-levels, respectively. By combining this information with Table 8, we computed the ratio of the mean number of years of previous financial services experience to the mean number of years of work experience per each job level. Table 9 shows these ratios.

	Numbers (%) [†] of participants	Numbers of years of previous work experience in financial services [†]	
		Means	Ranges
Entry-level participants	4 (12.9%)	0.6	0–13
Middle-level participants	6 (19.4%)	0.8	0–9
Senior-level participants	9 (42.9%)	4.0	0–25

[†]The percentages, mean numbers of years, and ranges of years were computed with reference to the total numbers of participants in the respective job levels.

Table 8. Participants With Previous Work Experience in Financial Services

Table 9 shows that previous work experience in financial services was relatively more common (or plausibly important) for senior-level participants (18.9%) than those at the entry (6.6%) and middle (5.2%) levels, though these percentages (or ratios) were small in absolute terms. This observation is explained by Groysberg et al. (2011), who argued that C-level executives (e.g., CIO) do not just manage their own business areas, but are also serving as active members of the company's senior leadership who advise the CEO on key decisions. Thus,

it is more desirable for senior-level participants to have exposure to other business sectors (particularly financial services). Mtetwa (2016) also argued that broad exposure allows executives to see the world beyond their immediate surroundings.

6.6 Summary of Major Observations and Their Corresponding Implications
Table 10 below summarizes the main statistics and observations as discussed from Section 6.1 to Section 6.5. Based on the observations listed in Table 10, we discuss their corresponding implications on universities and graduates.

First, Observation 1.B seems to suggest that an undergraduate IT degree (with a "standard" IT curriculum) is sufficient (and a straightforward way) for employment in the FinTech industry. Thus, introducing new and "specific" FinTech degrees (e.g., Master of Financial Technologies at Swinburne University of Technology in Australia) may be unnecessary. Despite this observation, universities (and graduates) are advised to adopt a more proactive and forward-looking attitude for offering (and receiving) their FinTech education. Since the FinTech sector is dynamic, highly sought-after, and pays well (McMurray, 2023), securing a FinTech job is never easy. Furthermore, Bhandari (2017) argued that:

- "[FinTech job applicants] won't be expected to know everything, but [these applicants must] know more than: 'it's, like, banking apps on [the] phone.'"
- Since FinTech is a technically advanced form of finance, job applicants need to know not only the concept of money and the financial world, but also the different kinds of technologies that underpin FinTech.
- FinTech is all about designing and implementing "innovative" solutions for financial services.

Thus, even if universities opt not to offer "specific" FinTech degrees, they should still revise the existing curricula of their undergraduate IT degrees (within the curriculum constraints) with a view to incorporating the following elements into the curricula: (a) fundamental concepts of banking and financial services, (b) business innovation, and (c) different kinds of FinTech technologies (e.g., AI/machine learning, big data/data analytics, blockchain/cryptocurrency, API, and cloud computing (Cheng et al., 2022; Lee & Lim, 2021; Nguyen et al., 2022; Ünsal et al., 2020)). Similarly, those IT graduates who intend to start a FinTech career should look for an undergraduate IT degree with a curriculum incorporating the above three elements.

Second, Observation 2.A indicates that only very few FinTech practitioners have relevant professional qualifications (e.g., CFtP) and formal training (e.g., a certificate course in FinTech). However, we caution that the importance of such qualifications and formal training should not be overlooked. Section 6.2 reports that 9.7% of both the entry-level and middle-level participants possess relevant professional qualifications and/or formal training. We argue that these percentages, though not high, should not be ignored. In our survey, some participants expressed that they were unable to receive professional training due to insufficient training budgets in their companies and limited time for attending training caused by a heavy daily workload (see Section 6.2). Thus, on the one hand, graduates should consider earning such professional qualifications or attending formal training

(alongside with their university studies where their free time is relatively abundant) before applying for (or starting) a FinTech job, so that they have a competitive edge over others in the FinTech job market. On the other hand, universities should consider offering non-credit-bearing short courses on FinTech.

For example, in Australia, the University of Melbourne offers a 5-week online course on FinTech and blockchain, and Monash University offers a 24-week professional FinTech Boot Camp to address the need for FinTech training.

	Mean numbers of years of work experience	Mean numbers of years of previous financial services experience	Ratio of the mean number of years of previous financial services experience to the mean number of years of work experience [†]
Entry-level participants	9.1	0.6	6.6%
Middle-level participants	15.5	0.8	5.2%
Senior-level participants	21.2	4.0	18.9%

[†]The percentages are computed with reference to the total numbers of participants in the respective job levels.

Table 9. Popularity of Previous Financial Services Experience at Each Job Level

	Statistics	Observations
RQ1	1.1. The percentages of participants with a degree (any discipline) were 100.0% (entry level), 93.5% (middle level), and 90.5% (senior level).	1.A. A degree is almost an "entry ticket" into the FinTech career at all job levels.
	1.2. Most participants have an undergraduate IT degree (range of percentages = [66.7%, 80.6%]) than a postgraduate IT degree (range of percentages = [9.5%, 29.0%]). Also, the difference of the two ranges is fairly large.	1.B. Possibly the most straightforward way to start the technical-oriented FinTech career is to earn an undergraduate IT degree.
	1.3. Most participants have at least one IT degree (range of percentages = [73.7%, 89.7%]).	
RQ2	2.1. Only very few participants have earned/received FinTech-related professional qualifications and formal (external) training (entry level = 9.7%; middle level = 9.7%; senior level = 0.0%).	2.A. Because only very few FinTech practitioners have relevant FinTech professional qualifications and formal training, graduates should consider earning such professional qualifications or attending formal training before applying for a FinTech job. This will give the graduates a competitive edge over others in the FinTech job market.
	2.2. Most trainings received by participants were "on-the-job."	
RQ3	3.1. The mean numbers of years to start the first FinTech jobs increased from entry (4.7 years) through middle (9.7 years) to senior (14.7 years).	
	3.2. Across all the three job levels, the minimum number of (whole) years to start the first FinTech job after earning the highest academic qualifications was zero.	3.A. Some FinTech practitioners were able to start their first FinTech jobs immediately or shortly (less than 5 months) after obtaining their highest academic qualifications (entry level: 25.8%; middle level: 6.5%; senior level: 4.8%).
RQ4	4.1. The mean numbers of years of previous IT work experience of participants were 5.9 years (entry level), 11.6 years (middle level), and 14.2 years (senior level).	4.A. Possessing previous IT work experience is almost a norm for FinTech practitioners (also see Observation 1.B above).
	4.2. Only two participants did not have any previous IT work experience.	
	4.3. Only few (16.9%) participants possess previous work experience in non-IT areas.	4.B. It is not that popular for FinTech practitioners to have previous non-IT work experience.
RQ5	5.1. Previous work experience in financial services was relatively more common (or plausibly important) for senior-level participants (18.9%) than those at the entry (6.6%) and middle (5.2%) levels, though these percentages were small in absolute terms.	5.A. For those FinTech practitioners with previous work experience in financial services, they may have a higher chance to be promoted to executives.

Table 10. Summary of Statistics and Observations

Next, we consider Observation 3.A. This observation indicates that, although only a small percentage of graduates were able to start their first FinTech jobs immediately or shortly after obtaining their highest academic qualifications, it is still not at all impossible to "give it a try" (particularly the entry-level FinTech jobs where the percentage of "fresh" graduates was 25.8%). In spite of Observation 3.A, Observations 4.A and 4.B together suggest that previous IT (rather than non-IT) work experience is useful for graduates to enter the FinTech sector. Thus, for those IT graduates who have career aspirations in FinTech but are not confident to apply for a FinTech job shortly after graduation, they should consider working in an IT area for a few years before pursuing their FinTech career aspirations.

Finally, we turn to Observation 5.A that is more relevant for a "longer-term" FinTech career aspiration from the graduate's perspective. This observation indicates that although the demand for previous work experience in financial services is not high for the entry-level (6.6%) and middle-level (5.2%) participants, such experience becomes more important for the senior-level participants (18.9%). Considering Observations 4.A, 4.B, and 5.A together, IT graduates are advised to start their first jobs in an IT area (e.g., systems/platform development) in financial institutions (e.g., banks and insurance companies). This allows IT graduates to have a better chance of securing their first FinTech jobs later and getting promoted to more senior FinTech positions in the future.

6.7 Self-Reflection on Commencing the FinTech Journey
Besides asking questions in the survey related to RQ1 through RQ5, we also requested the participants to self-reflect on their decision to start the FinTech journey with the question: ***"Do you think that it is a good move to start the FinTech career?"*** Although 83 participants completed and returned the questionnaires, only 11 of them answered this question. We speculated that the low completion rate of this question was possibly due to its "sensitivity," since some participants might worry that their answers would be disclosed to their companies even though we have emphasized that the participants' answers would only be reported anonymously.

Since only 11 answers were received, meaningful statistics could not be computed. Nevertheless, we analyzed these 11 answers and found that they could be broadly classified into three types. Below we give an example of each type of answers for illustration:

- ***Type 1 — Job insecurity (four answers):*** *"My company is a startup and is not making money. The business does not run itself. My company may close down if this situation is not improved. The chance of losing my job really make me stressful."* (from an entry-level participant of a platform provider)
- ***Type 2 — Mismatched job expectation (four answers):*** *"I expected a 'technical-oriented' job after entering FinTech. But now I found that most of the times I am dealing with clients to sell our products [e.g., apps]. I don't like to work as a salesman."* (from a middle-level participant of an app developer)
- ***Type 3 — Difficulty in selling products or services (three answers):*** *"I feel that our apps are well designed, but this does not translate into sales."* (from an entry-level participant of an app developer)

We first look at Type-1 answers. Among the 48 subject companies in our survey, many of them are young startups funded by venture capitalists and banks. According to a report by the Australian Financial Review (Redrup, 2019), Australian FinTech startups are generally young and ambitious, but most of them do not generate any revenue. Without revenue, these startups will be forced to shut down or sell themselves when they run out of funding and the interest rates surge (Son, 2022). These startups also face several issues and challenges, from regulatory to fundraising and competitive issues, thus making the business operating environment very difficult (Harroch & Guzy, 2019).

Now we turn to Type-2 answers. Recall from Finding 1.3 in Table 10 that most participants have at least one IT degree (undergraduate or postgraduate). Since they graduated with an IT background, it is reasonable to assume that they prefer to work in a function that involves significant "technical" elements (e.g., app and platform development). However, it is reported that some FinTech practitioners (especially those at the middle- and senior-levels) have found themselves spending more time building spreadsheets and pitch books as well as "selling" or "promoting" their products to clients — tasks that these "technical-oriented" practitioners may find boring (WiLowWallStreet, 2018).

Last, we consider Type-3 answers. It is reported that even great FinTech products that solve an important financial problem may not sell themselves (WiLowWallStreet, 2018). This issue may be attributed to "trust." Many young FinTech startups do not have a long company history. In this case, it may be difficult for these startups to: (a) earn trust from customers, and (b) convince customers to do business with them. Customers may also not trust the technologies (e.g., AI) used to enable the FinTech products and services (Brenner & Meyll, 2020; Zarifis & Cheng, 2022).

7. RELATED WORK AND OUR CONTRIBUTION

There are only a few studies on curriculum design related to FinTech. Chen et al. (2019) proposed using industry-academia collaboration to design or revise a finance curriculum. They argued that "traditional" finance curricula had been built upon the framework of classic Economics. This model fails to produce qualified graduates to work in the finance sector as the landscape changed due to the emergence of FinTech. The curriculum-design approach by Chen et al. (2019) aims to produce graduates with practical skills that align with current and emerging needs of the finance industry.

In their study, Karkkainen et al. (2018) argued that: (a) the skills pertaining to FinTech have not yet been organized in a widely-recognized supporting body of knowledge to be used by taught programs, and (b) the business (rather than IT) schools are natural learning platforms of FinTech due to their expertise in approaching business problems from a multidisciplinary perspective. Karkkainen et al. (2018) also performed an inquiry into some recently developed FinTech programs, and identified the following FinTech-related courses:

- **In the finance/management component:** Financial Information Systems; Managing Innovation; Investment Portfolio Analysis and Management; Financial Risk Management; Applied Computational and Quantitative Finance; Financial Regulation and Ethics; FinTech Entrepreneurial Finance; FinTech

Personal Finance; Financial Planning and Wealth Management.
- **In the IT component:** Big Data; AI; Machine Learning; Cryptography/Cybersecurity and Forensics; Human-Computer Interaction and Design; Computer Visualization Methods and Applications; Blockchain Technology.

Our work differs from the above two studies in the following aspects:
- The study by Chen et al. (2019) focused on the finance sector involving finance graduates; our study focuses on the specific FinTech sector involving mainly IT graduates.
- The study by Chen et al. (2019) aimed at analyzing the effectiveness of "traditional" finance curricula to prepare graduates for the finance sector and proposed a revised finance curriculum that better aligns with the industry needs. On the other hand, the study by Karkkainen et al. (2018) was aimed at analyzing some recently developed FinTech programs. Our work, however, has a different focus than these two studies (i.e., Chen et al., 2019; Karkkainen et al., 2018). The main purpose of our work is to investigate the impacts or implications on universities and graduates by the growing popularity of FinTech.

Because of the above differences, our work has addressed a knowledge gap in the literature. More importantly, our work has shed light on and demonstrated how to use the credentials of existing FinTech practitioners to support informed decisions to: (a) those universities that offer or plan to offer FinTech education, and (b) graduates who are considering starting their FinTech career after completing their studies.

8. LIMITATIONS

Although our study increases the understanding of the employment and career prospects of FinTech, the study has several limitations. As with most survey studies, our survey involves interpretation and recall bias of the participants. In addition, since our survey was voluntary and self-reported, sampling bias might have occurred. Because our questionnaires were largely completed by those participants who were sufficiently interested in FinTech so they spent time to response, whether our findings can be generalized to others without sufficient interest in FinTech is in doubt. Also, since our survey was conducted in an Australian context, readers are cautioned not to generalize our findings to other countries without further work and analysis.

Our sample size was not large, involving only 48 subject companies and 83 participants. Our study would have been better if the sample size was larger. Furthermore, even though our survey was conducted recently (between December 2022 – January 2023), one should be cautioned that our findings only provide a "rough" picture about the employment and career prospects of graduates in the FinTech landscape. This is because:
- The survey period occurred in the early-to-mid stages of emerging from the global pandemic. This factor would have an impact on FinTech issues.
- The FinTech space is rapidly changing and growing.

- The employment of graduates (including the time durations to start their first FinTech jobs) is affected by several factors such as:
  - *The number of graduates seeking to start their FinTech career:* If the FinTech sector continues to bloom and create a good prospect career, more graduates will start entering this sector. This factor alone will increase job competition.
  - *The number of FinTech companies in the sector:* If the FinTech sector continues to grow, more and more FinTech startups will be established and recruiting employees. This factor alone will lower the hurdle of getting a FinTech job by graduates.
  - *The number of "specific" FinTech degrees offered by universities:* Today, some universities have started to offer such degrees in response to the growing demand for trained graduates in the FinTech sector. For example, in Australia, Swinburne University of Technology and the University of New South Wales offer master's degrees in FinTech via their business schools. Poon et al. (2023) further observed that, among Australian universities, almost all FinTech education is offered by their business (rather than IT) schools. Graduates with these "specific" FinTech degrees may displace other graduates only with an IT degree when applying for a FinTech job.

9. SUMMARY AND CONCLUSION

In this paper, we have discussed our recent survey study to investigate the current employment and career prospects of technical-oriented FinTech jobs from the university's and graduate's perspectives in the Australian context. Our study involved 48 subject companies and 83 participants of three different job levels (entry, middle, and senior). We have analyzed the participants' responses with respect to our five research questions. Based on these responses, we have compiled a list of observations (see Table 10) and discussed their corresponding implications on universities and graduates (see Section 6.6).

Despite the continued and unparalleled growth of FinTech, it is interesting to note that some participants doubted their decision to start a FinTech career due to several reasons such as job insecurity, mismatched job expectations, and the difficulty in selling FinTech products and services. Nevertheless, FinTech will continue to be under the spotlight of the financial services industry and it provides another career path for graduates. It would be wise for graduates (and even those who have not yet graduated from universities) to collect more relevant information about FinTech and to seriously consider whether commencing the FinTech career is an option to them.

During our study, we observed that a growing number of Australian universities have started to offer their "specific" postgraduate FinTech degrees in response to the popularity of FinTech. For example, Swinburne University of Technology is offering its Master of Financial Technologies and the University of New South Wales is offering an online Master of Financial Technology. In our study, none of the participants has earned such a degree. However, we speculate that more and more students planning to start their FinTech careers will

consider studying these "specialized" master's degrees. Thus, it would be worthwhile to perform future studies to investigate the level of acceptance of these degrees in the FinTech community.

10. ACKNOWLEDGEMENT

11. ENDNOTES

1. Readers are cautioned that only few participants have earned/received FinTech-related professional qualifications and/or formal training do not necessarily imply that these qualifications and training are considered unimportant to FinTech practitioners.
2. This design applied to RQ3, RQ4, and RQ5.

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Pak-Lok Poon received his Ph.D. degree in software engineering from The University of Melbourne, Australia. He is an associate professor with the School of Engineering and Technology, Central Queensland University, Australia. His research interests include software testing, requirements en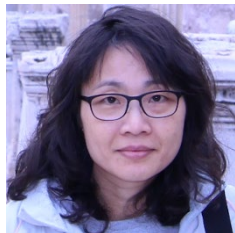gineering and inspection, spreadsheet quality assurance, electronic commerce, financial technology, and information systems education. He was a guest editor of two special issues of the *Journal of Systems and Software* in 2018 and 2021, respectively. He is also on the editorial board of the *Journal of Organizational and End User Computing*, *Journal of Information Systems Education*, and *International Journal of Information Systems and Supply China Management.*

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APPENDIX

A Simplified Version of Our Questionnaire Survey Protocol

Your name (optional): _____

Your job title: _____

Your company: _____

Briefly describe the main business of your company below:

List your undergraduate degree(s) below. If you do not have an undergraduate degree, leave the following table blank.

Degree (including the discipline), e.g., BSc (Computer Science)	Year of completion

List your postgraduate degree(s) below. If you do not have a postgraduate degree, leave the following table blank.

Degree (including the discipline), e.g., MBA, Master of Economics	Year of completion

Do you have any FinTech-related professional qualifications and/or formal training? If yes, provide the details in the following table:

| FinTech-related professional qualifications/formal training	Year obtained/attended

Number of years to start your *first* FinTech job after earning your highest academic qualification: _____ (rounded up/down to the nearest full years, e.g., 2.5 years → 3 years)

In the following table, list all your previous work experiences and their durations (rounded down to the nearest full years) *before starting your FinTech career*. In the two rightmost columns of the following table, indicate with a "√" if this work experience is related to IT or financial services.

Previous work experience		For how long (in full years)?	IT-related? (√ or ×)	Financial-services related? (√ or ×)
Job title	Job description			

Self-reflection: Do you think that it is a good move for you to start the FinTech career? Please explain.

INFORMATION SYSTEMS & COMPUTING ACADEMIC PROFESSIONALS
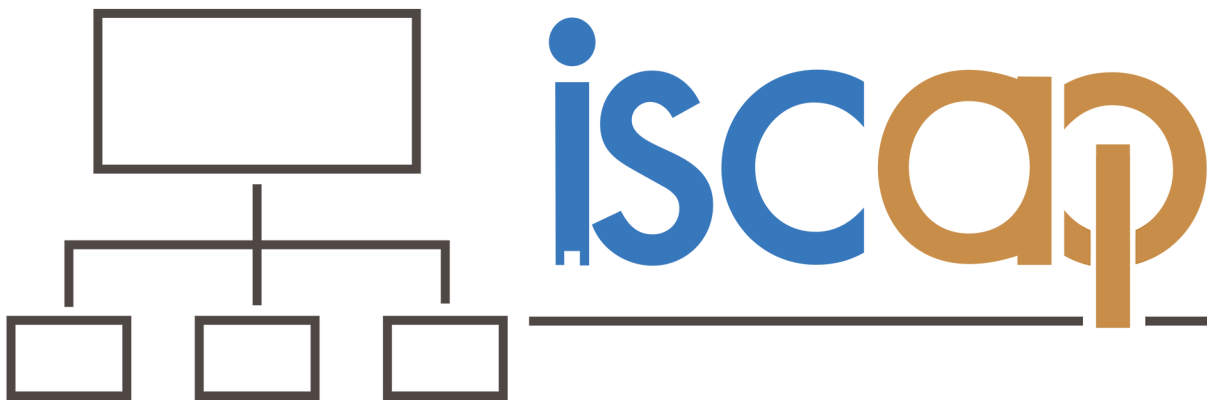
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