Preparing the next Generation of China's Computer Scientists: A Snapshot of Challenges for Sino-foreign Computer Science Education

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Abstract. The first Sino-foreign higher education institution (SFHEI) opened in China over ten years ago, and was followed by a number of others, all offering opportunities to the local Chinese student population to not just experience a foreign education style, but also earn a foreign degree, and, in some cases, study overseas as part of their student life. The experiences for students (and faculty) at these institutions were not without difficulty, and a number of obstacles had to be overcome, especially in the early years. As time has progressed, and these institutions have become more accepted and mainstream, the kinds of challenges facing the stakeholders have also evolved, but not yet disappeared. Following an autoethnographic tradition, this paper draws on both semi-structured interview data, and the author's own decade of experience teaching computer science in Sino-foreign universities in China. It presents some reflections on what are perceived as continuing challenges for computer science education in these institutions.

Keywords: Computer Science Education; Sino-foreign Higher Education; Transnational Education; Staffing; Reflection

1   Introduction

As discussed previously (Towey 2014), China has seen incredible economic growth over the past thirty years, fuelled by a manufacturing industry boom that, if recent turbulence in the foreign exchange and stock markets (Economist 2015) are any indication, may now be slowing down, or even ending. A possible solution for China to continue its economic growth may lie in a change to a more service-oriented economy (Morrison 2015, Phillips 2010), but such a move faces a shortage of tertiary-level educated skilled workers (Ray, Mitchell, Abel, Phillips, Watson, Weddle, Hancock & Lawson 2012): As Fig. 1 shows, it is expected that by 2020, there will be a shortfall of about 24 million workers with a university or vocational education (Chen, Mourshed & Grant 2013).
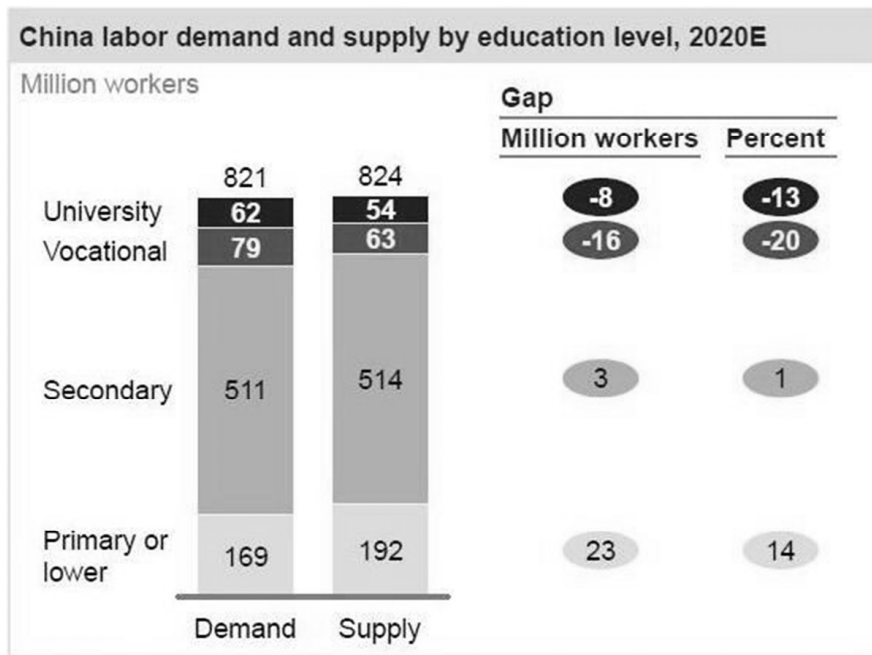
Fig. 1. Predicted 2020 PRC labour demand and supply (from Chen et al. 2013, p.4)

In part to address the expected shortage of a labour force with a higher education (HE), China has been enhancing its universities and HE provision (Li, Whalley, Zhang & Zhao 2012). One aspect of the Chinese HE changes has been the emergence of Chinese-foreign cooperatively-run schools (CFCRS), which enable foreign institutions to partner with Chinese ones. By 2013, these partnerships had produced 775 Sino-foreign projects, including both foreign degree programmes and new higher educations institutions (HEIs) (QAA 2013, p.6).

Autoethnography is a type of research involving "self-observation and reflexive investigation in the context of ethnographic field work and writing" (Maréchal 2009, p.43). Duncan (2004), discussing Peshkin (1985) and Eisner (1991), stresses that the subjectivity of the author is not only included, but emphasised; and that it is the researcher him/herself, as "connoisseur and instrument," who makes the study possible.

This paper draws on both semi-structured interview data, and the experiences of the author, an expatriate academic staff member teaching computer science (CS) in a Sino-foreign higher education institution (SFHEI) in mainland China, referred to in this paper as HEI-A. The development of SFHEIs in China over the past decade has not been without difficulty, and even now, the delivery of content programmes, for example CS, in these HEIs faces many challenges.

The rest of this paper is laid out as follows: Section 2 presents the situation for CS education at HEI-A, including a brief history of the HEI (Section 2.1), an outline of the HEI-A CS degree curriculum and delivery (Section 2.2), and discussion of the issues facing staff (Section 2.3) and students (Section 2.4) at HEI-A. A summary and some conclusions are given in Section 3.

2   Computer Science at HEI-A

The author has been working in the CS department at HEI-A, for three years, having previously worked at another SFHEI in China, HEI-B, for eight years.

2.1   HEI-A History

HEI-A was the first SFHEI to open in China, in 2004, and has since then grown in both student numbers and provision of academic programmes. As with many other SFHEIs, the student profile has also changed dramatically over the short period of its evolution, with the academic background of students on entry growing increasingly high (Huang & Towey 2010). From a relatively small student cohort of a few hundred students in 2004, the intake now annually exceeds a thousand.

2.2   HEI-A CS Curriculum

A feature of most SFHEIs is the awarding of a degree from an internationally recognised HEI outside of mainland China. The CS department at HEI-A delivers a number of CS-related undergraduate degree programmes, in several different modes, such as fully at HEI-A, or some combination of time at HEI-A and time at the parent HEI. The courses delivered at HEI-A are identical to those at the parent HEI, as is the final degree earned.

The initial delivery model for the CS department was for students to spend one to two years at HEI-A, followed by two years at the parent HEI (called a "2+2" model). The department has now expanded to also deliver complete degree programmes at HEI-A (called "4+0").

2.3   HEI-A CS Staffing

According to one informant, who joined HEI-A in 2008, he became the fourth full-time member of staff in the CS department. At the time, the newly formed department was only running the initial part of several undergraduate programmes, following the "2+2" delivery model which included a general first year at HEI-A (covering English and general education courses); a second year of (CS) content courses, also at HEI-A; and then the third and fourth years (CS content) spent in the parent HEI. The small student population size, and the relative youth of the institution, meant that the department faced many challenges common to small ventures operating under critical mass. In particular, staff turnover in that period was relatively high, and the department had to rely on additional temporary staff to help deliver courses, reducing the unity and consistency in its long-term plans. This particular issue seems to have been resolved in recent years, with the academic programmes expanding to include delivery of all content at HEI-A (removing a need for students to travel to the parent HEI), and the addition of more permanent staff who have been willing to stay longer in China.

There is a body of research addressing perceptions of the issues related to teaching Chinese university students, or Confucian Heritage Culture learners in general (e.g., Biggs 1996, Law, Yuen, Chan, Yuen, Pan, Lai & Lee 2010, Li 2010, Watkins & Biggs 2002, Wang 2006, Wong 2004). An important benefit of having a larger proportion of staff who are experienced teaching Chinese students through English is that they have learned how to overcome, sometimes through awkward episodes of classroom trials, underestimated difficulties in identifying how much of what they say is actually understood by the students. This was once a concern frequently raised in conversations or in the peer assessment process among teachers at HEI-A (and elsewhere (Huang & Towey 2010)) — at times leading to feelings of bemused resignation. Teachers reported the "poker face" effect, as one described it, after standing for an hour in class in front of the expressionless faces of unresponsive students, quietly sitting still and reluctant to divulge a clue, either orally or through their body language, as to how clear the discussed matter was to them.

This difficulty in obtaining student feedback is also not unique to HEI-A, and is something reported in many SFHEIs and other Chinese HEIs (Xie, Towey & Jing 2014). The difficulty engaging students was of course at odds with the student-centred methods and pedagogy prominently advocated by SFHEIs. A common strategy by teachers in response to this has been to put significantly more conscious effort into triggering interactions, as frequently as possible, including through the use of more short, on-the-fly informal oral and written questionnaires, sometimes in the form of quick team contests or games, either using pen and paper, or online tools — the main goal being to maintain a loop of immediate feedback between the teachers and the students. Such methods are not necessarily different to those used by teachers in a Western institution for the same purpose, but there is a reported perception of a need to apply these methods a lot more frequently, especially with the more junior students, in order to keep thin the language barrier that exists between teachers educated in the West and Chinese students who are still learning English at the same time as commencing their studies at SFHEIs. Moreover, it has been observed that in-class interaction with Chinese students has had to rely more on written media, apparently because reading and writing in a foreign language appears more comfortable than listening and speaking, particularly for students at the start of their studies.

Although many foreign staff coming to work in the SFHEIs may have been attracted by reports of the large amounts of research funding (and comparatively low overhead costs) in China, the realities of needing written Chinese language proficiency to apply for such funding have become a deterrent to some staff remaining. Even for those foreign staff fortunate enough to have secured research grants, there are reports of frustrations stemming from the constraints on how the funding can be spent. One informant has been in such a position. Although he successful secured funding from different Chinese official bodies, at both local and national levels, the restrictions surrounding the use of the allocated budgets were not compatible with the kind of project they were supposed to support. Simplifying a bit, the funds were meant to be used mainly for hardware and consumable costs, whereas the projects, due to their theoretical nature, essentially required money to hire staff with specific expertise. The principal investigator was therefore put in the frustrating position of having enough money to employ the experts he needed to contribute to the project, but could not actually use the money for that purpose. The only portion of the

funding which was really useful was that covering travelling costs to conferences or to visit other institutions. Although the projects were closed successfully, a large proportion of the budgets had to be left unspent.

As with any expatriate posting, the foreign staff working at HEI-A, and other SFHEIs, face a number of cultural and linguistic challenges. The isolation reportedly felt by many new staff coming to places like HEI-A and HEI-B has apparently resulted in those staff not remaining. It has been suggested that really only those foreign staff with families or relationships here in China have been able remain for any length of time — this suggestion fits with the situations of the author and informants of this paper.

2.4   HEI-A CS Students

Similar to many other HEIs, HEI-A has a pastoral tutorial system through which teachers are paired with a small group of students, with whom they regularly meet individually. During these meetings, the tutees can spend time discussing any issue, concern or plan regarding their student life and expectations. These privileged moments shared between students and teachers, along with other casual discussions at departmental activities, have allowed identification of a few aspects of our students' lives that are perhaps specific to the local Chinese students.

One such aspect is the adoption by some Chinese students of a strategy to build a portfolio of experiences and qualifications, of which their final HEI-A CS degree is only one. Such an attitude is common both for Chinese and foreign students, but the apparent low priority given to the degree programme by students at HEI-A was worrying. Students, particularly the junior ones, were observed allocating more time to their extra-curricular activities and pursuit of alternative qualifications than to their official course studies, resulting in often quite poor academic performance. HEI-A, following the parent HEI's academic regulations, has had to terminate the studies for students not achieving passing grades, something that may have come as a surprise to the students. Similarly, and worryingly for HEI-A, was the fact that some students described their intention to only obtain their final degree, even with a low passing mark, as long as they could put it down on their *curriculum vitae*. Even when made aware that such a degree may be of little value when seeking a job or attempting to pursue postgraduate studies overseas, these students often replied that such concerns did not matter, and that it was their belief that the degree would still be very useful in China, especially when presented with additional qualifications.

It seems that the HEI-A students, like those reported in other SFHEIs (Huang & Towey 2010), have been changing over the course of the institution's development, with more recent intakes having a stronger academic profile and English proficiency, and scoring in the top band of China's National College Entrance Examination (NCEE), or *gaokao* (Yu & Suen 2005). Increasing numbers of HEI-A graduates now continue their studies, sometimes to doctoral level, in well-ranked overseas universities, leading to more recent students, hoping to follow in their footsteps, prioritising their academic studies at HEI-A over fanning out the range of their qualifications.

It has been suggested that the SFHEIs represent an innovative approach to HE, and are themselves potential centres for innovation in the classroom (Towey & Wang 2015). The diversity in both the student and staff populations, cited as a source of strength (Liu, Kuo, Towey & Chen 2014), continues to grow.

3   Conclusion

Sino-foreign higher education institutions (SFHEIs) first began appearing in China a little over a decade ago, and have since then multiplied and become well-accepted routes through higher education. These SFHEIs now attract some of the best and brightest students — and staff — but continue to face challenges. In the future, as China offers more variety in high quality higher education options, the comparatively high price of the SFHEI fees may reduce their appeal again. Staffing the SFHEIs is also not easy, and the comparatively higher salary and package which previously set SFHEI jobs apart from local university jobs is declining, with well-funded local universities now increasingly able to compete. Nonetheless, for now at least, these SFHEIs are enjoying a popularity with both students and staff.

Acknowledgements

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