Researched on Improving the Adaptability of Applied Talents in Terms of Integrated Circuit Industry Based on Data Mining

Wenhua Liu[(✉)]

Office of Planning and Quality Assessment, Shanghai Urban Construction Vocational College, Shanghai, China
lwhuajky@163.com

Abstract. In the age of big data talents of integrated circuit have to face to higher requirements from industry. The education goal of integrated circuit talents should reform relevantly. By data mining, this article deeply analyzes the law of talent adaptability under the influence of big data through discussing the development of integrated circuit technology at same time, and provides some solutions to improve the adaptability of applied talents in the integrated circuit industry. The counterplan includes the following aspect: to construct more cooperation mechanism between colleges and enterprises, to consummate curriculum system, to strengthen internship teaching, to deepen the cultivation of engineering practice abilities. All these methods can help the resolve of talents requirement in integrated circuit to meet the requirement of big data. Data mining would help administrators make scientific decision so as to provide targeted guidance.

Keywords: Applied Talents · Integrated Circuit · Industry; the Age of Big Data

1 Introduction

In the age of big data, integrated circuit is the strategic highland national high technology among countries. In global view the development of integrated circuit in deferent countries is unbalanced. Many key technologies are controlled by several countries. Nowadays, the development of manufacturing industry is striding forward intellectualization. Information technology is more and more introduced into manufacturing industry. Under this background, the technological breakthrough of integrated circuit becomes the key point of industry upgrading. Therefore, many countries worked out kinds of introduce policies which aim to promote the development of integrated circuit so as to guarantee national safety and social stability.

As we all know, integrated circuit is a practical discipline. Therefore, the talents cultivation of integrated circuit should cling to cutting-edge technologies of industry and train their practical abilities which is on the basis of industry requirements. Another character of integrated circuit industry is timeliness. The fundamental reason is the rapid development of integrated circuit technology and the talents cultivation falls behind the

speed of technology alternation. These two characters require that higher education should link closely to industry and the talents cultivation aims to enterprises' needs. So this research would like to explore the new mode of talents cultivation of integrated circuit which mix colleges and enterprises together.

Higher education is in the period of significant transformation. Talents of integrated circuit have to face to higher requirements from industry. So the student administration based on data digging can be contribute to scientific decision-making. The continuous tracking of graduates need to be done by data digging on education quality [1].

2   Data Source and Mining

2.1   Data Source

According to the 2020 software engineering syllabus, we chose twenty-eight courses and 103 interviewed students from software engineering program and Computer science and technology program. We used survey tool that is called LimeSurey, which is one online survey application (Table 1).

2.2   Data Mining

The research is to find out the connection between different courses in the two programs and the relation between these courses and employment status. So we use data mining of association rule and the algorithm of Apriori. The tool is Weka3.8 (Table 2).

Table 1. Student employment data

Program	Internship	Offer	Offer > 2	High salary
Software engineering	62 (63%)	79 (81%)	(4401%)	57 (67%)
Computer science and technology	55 (66%)	61 (73) %	23 (28%)	23 (31%)

Table 2. Algorithm parameter setting

Order	parameter	result	meaning
1	Delta	0.05	Iterative diminishing
2	LowerBound-MinSupport	0.1	Minimum lower bound of support
3	MetricType	Confidence	Measure type
4	minMtric	0.9	Minimum measure
5	numRules	10	Founded rule quantity

3 The Analysis of Talents Cultivation in the Field of Integrated Circuit by Data Mining

3.1 Higher Demands of Talents Cultivation Raised by Integrated Circuit Industry in the Age of Big Data

To solve the contradiction between the important strategical opportunities of integrated circuit industry development and critical requirements from society and economical progress, many countries formulated related policies to cultivate high-tech talents in universities [2]. Universities cooperate with enterprises to construct service platforms which aim to train professional capabilities of high-tech talents. From the inside view of integrated circuit industry, the reserve of talents majored in integrated circuit is scanty in count, especially medium- and high-end talents. Whether encapsulation testing and wafer manufacturing or digital IC design, design talents and other technicians are all lacked. In consequence the contradiction between talents cultivation in universities and talents demands from enterprises should be paid attention.

3.2 Gap Remaining Between Talents Cultivation of Traditional Integrated Circuit and Industry Demands

Integrated circuit is a comprehensive discipline which highlights engineering practical abilities of academic research, design, innovation and tools application. Integrated circuit industry relates to technologies and application of several industry chains. However, curriculum setup and contents in universities do not synchronize industry progress. Students' knowledge and skills gained from class teaching and experiments still fall behind high-quality talents cultivation. For example, the practical teaching of EDA software requires long-term practical exercises [3]. But subject to class hour and limited experiment equipment, students are hard to get the opportunities of long-time practical exercises. As to chip manufacturing, capsulation and testing which are higher level professional program, students can get less chances to practice for a long time to get working experience.

3.3 Deep Integration Between Universities and Enterprises to Cultivate Talents of Integrated Circuit

Recent university-enterprise cooperation is hard to form long-term mechanism. Generally, the cooperation remains a pretty simple mode. For instance, universities invite enterprises experts to give a speech or sent staff to have a visit to enterprises. These cooperation modes can help students expand their professional horizon through learning latest technologies and industry development. But feedback information suggests that these latest technologies and industry development are hard to get involved in core process of talents cultivation and have less effect to promote students' engineering practical capabilities [4]. Because of condition limits, most universities do not have the engineering practice condition to cultivate high-quality, applied talents of integrated circuit. Therefore, to meet the demand of talents cultivation of integrated circuit industry, we should urgently explore new mode and mechanism of deep university-enterprise cooperation.

4   Reform of Talents Cultivation Mode of Integrated Circuit Through Meeting Industry Demands

To solve these problems above, we come up with a new talents cultivation mode which is based on traditional system of talents cultivation. The new mode is named as sandwich Mode that mix university and enterprise together. The exploration of talents cultivation can strengthen students' practical abilities to cultivate high-quality talents needed by integrated circuit industry. The mode includes the following parts.

4.1   Curriculum System Construction of Industry-Academy Cooperation in the Age of Big Data

The curriculum system should insist on industry requirement orientation. The requirements of knowledge structure for integrated circuit researchers are fairly high. And the main part of talents is graduate-level workers. The curriculum setup system of integrated circuit program should be wholly optimized. Through the Closed-loop of college-setup, enterprise-feedback and college adjustment, the program orientation which aims to market demands of integrated circuit industry is emphasized. The curriculum system is constructed by the cooperation of enterprises and colleges. Enterprise resources are introduced into course content. Enterprise engineers and technicians should be invited to have professional speeches which introduce the latest technologies. These efforts can help students obtain updated professional knowledge and mission and shape industry understanding and responsibilities [5].

4.2   The Synchronization Between Talents Cultivation and Industry Development Requirement

To achieve the practical abilities orientation as the goal of talents cultivation, practical internship flatform should be set up on campus. The flatform constructs the real engineering practical circumstance which integrates with enterprises workshop. And basic profession courses and real training are finished on the flatform. Practical internship flatform assists students the continuous accumulation and longitudinal ascension of their engineering practical capabilities which can meet the abilities requirements of practical engineering talents from enterprises development in the age of big data.

4.3   Double-Advisor Model Carrying Forward the Construction of Off-Campus Internship Base

The construction of all-round engineering practical flatform centers on the full industry chain of integrated circuit which includes design, manufacture, package test, system application. According to the participation level of students in enterprises' workshop, internship can be divided into two types: noviciate and operation internship. In the period of students' participation in enterprise internship, college should strengthen the interaction between college and enterprise and visit aperiodically enterprises. Students' internship report should be checked on time. The continual improvement of talents

cultivation project should accept the feedback suggestions from enterprises and students through caring for students' internship circumstance and living. The big data can provide new tools.

4.4   To Strengthen Faculties' Engineering Competency

To strengthen faculties' engineering background is one of the key aspects of cultivating high-level engineering talents. Internship can be taken as a bridge to connect faculties with enterprise experts which would increase their communication and information exchange. Through these methods, faculties can receive the latest technological development and industry requirements. The big data would help the process.

On the one side, faculties are encouraged to carry out project-teaching exploration to improve students' innovation ability. The way can cultivate faculties' comprehensive practical capability. On another side, colleges strengthen the communication with regional leading enterprises and apply for regional technological project together. The faculties' engineering research capabilities are improved. At the meanwhile, faculties are encouraged to participate a few influential professional training and industry conferences. It would help faculties receive latest development tendency of electronic information field, especially in big data field.

5   Current Obstacles Facing by Talents Cultivation in University

Discipline is the basic unit of talents cultivation and play important role in the process of talents cultivation in universities. Through the status of discipline gets enough importance in 21st century, the integrated circuit development in universities is still on the stage of experiment and exploration. Especially, integrated circuit talents cultivation is still facing many practical problems and dilemma.

5.1   Integrated Circuit Discipline Construction is Lately Started and Still Do Not Form Integrated Circuit Program Cluster

In recent years, programs which are related to integrated circuit are set up in universities, but the construction of integrated circuit discipline is still relatively laggard. The talents cultivation and academic research is dispersed in other level-1 disciplines. At the same time, integrated circuit program cluster is still not formed. To a large extent, this situation would hinder the development of integrated circuit discipline and programs and talents cultivation.

5.2   The Integrated Circuit Talents Supply is Out-of-Balance and Lack of Quality Faculties

As far as it goes, the primary problem faced by integrated circuit industry development is the heavily unbalance between talents supply and demand. From the view of integrated circuit talents supply in world universities, there no more than 400 universities which offer integrated circuit programs. Even though there is a greatly lack of millions

integrated circuit talents. Obviously such a small integrated circuit talents supply cannot meet the huge demands from labor market. Otherwise, there is another problem which integrated circuit talents cultivation in universities have to solve. That is the lack of quality faculties.

There are three layers in integrated circuit industry chain and their application fields. They are base layer, technology layer and application layer. Among them, base layer is the most needed field in integrated circuit talents. It mainly includes software, algorithm and flatform. Nowadays, these fields are lying in the period of high-speed and breakout development. So high-level research talents are urgently needed.

These talents demands impact talents cultivation in higher education. They can help the research and breakout in integrated circuit base layer. But in terms of technology layer and application layer, the talents supply is still in deficiency. That means the talents cultivation in higher education is the main provision field. But the supply in primary education, vocational education and adult education is tardy. And the cultivation system of integrated circuit talents is unfit.

5.3   The Education and Cultivation Structure of Integrated Circuit Talents is Still Defective

The character of integrated circuit talents cultivation in universities is which graduate student cultivation is in key position. The talents cultivation system which includes undergraduate, graduate and doctoral education has been set up. The education system could help the research and breakthrough in integrated circuit base layer. But to technical and practical layer all needed talents and normal consumers it is still incomplete. The big data puts forward new requirements.

6   The Issue of College Talents Cultivation in the Age of Big Data

6.1   The Vision of Talents Cultivation Lags Behind the Requirement of Integrated Circuit Development

Traditional teaching in colleges is teacher-centered model. The teachers are the dominant power in teaching process. The students are in the position of passive learners. In the age of big data, the social and economical development require that workers should have the capabilities of more creativity, self-management, self-drive and self-learning. So these requirement suggest that colleges talents cultivation should be student-centered and pay more attention to the cultivation on personality development and potency digging. But for now, teacher is the teaching dominant leader. They pay less attention to the development of student personality and self-development cultivation. This doesn't conform to the requirements of big data. Big data encourages personality and autonomy.

6.2   Teaching Theorical Knowledge is Too Much Emphasized in the Process of Talents Cultivation

The barrier between different disciplines and programs is much severe. Interdisciplinary education develops slowly. In the field of applied higher education, disciplines and programs are not only one kind of education unit and the classification result of professional
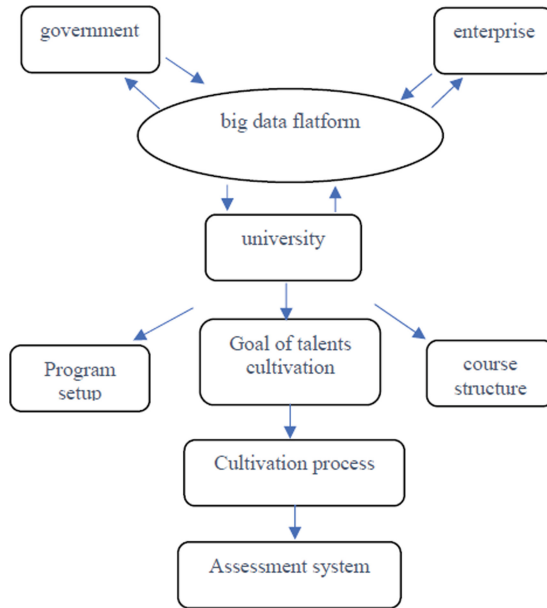
Fig. 1. Structure of talents cultivation in the age of big data

knowledge, but also a symbol of administration system which is highly fragmented and segmentary. Different disciplines and programs distribute different academic resources. At the same while, administration system is the frame and basis of redistributing and reproducing academic resources. In the system of education administration in which disciplines and programs are the boundary, every discipline is self-reclusive. There is little possibility to be chiastic fusion. In the age of big data, the trend which different disciplines mix together becomes more and more obvious. But for most colleges, the integration of traditional disciplines and programs are stumbled by traditional management system and all kinds of stakeholders. The practical integration between disciplines and programs is still tardy (Fig. 1).

6.3 The Specification of Talents Cultivation Cannot Effectively Meet the Demand of Workers' Comprehensively General Skills in the Age of Big Data

The cultivation of general skills is weak, which is contrary to the demand to the synergy between work positions in the age of big data. The work character in the age of big data has deeply widely shifted. The concentration degree in industry production process gets constantly improved. At the same while, the requirements to operational technologies become lower, but the requirements to technician in the capabilities of communication, leadership and cooperation get increased. In fact, the specification of talents cultivation in colleges focuses on knowledge memory. They pay little attention to technical capabilities so as to get employed easily. So we should transfer work center of talents cultivation in colleges.

6.4 The Curriculum Development and Textbook Which Focuses on Integrated Circuit is Lagged

In curriculum and textbook development, most colleges have offered integrated circuit courses, but the scale and sorts of courses cannot meet the demand of practical learning from students. Likewise, in new types of courses, for example network courses and experiential courses, specialized integrated circuit courses is pretty few, which heavily affect the efficient advance of integrated circuit education in colleges.

7 Conclusion

Data can tell the hidden truth. Data mining would help administrators make scientific decision so as to provide targeted guidance. Integrated circuit is the cereal of electronic information industry in 21st century. It is the important base to develop modern advanced technology and modernization of national economy. The Sandwich Mode that mix university and enterprise together faces industry development. On the background of new engineering education, the Sandwich Mode is one route to explore deep integration between industry and college, and improve students' engineering practical capabilities and comprehensive innovational abilities. The exploration of talents cultivation can strengthen students' practical abilities to cultivate high-quality talents needed by integrated circuit industry through data mining.

References

1. Cai Y, Ma Y, Niu X (2020) The impact to integrated circuit from coronavirus pandemic and challenges. Acad Res 6:86–93
2. Lei B, Geng L, Wu M, Cheng J, Lei S (2019) Reform of practical teaching of integrated circuit under the background of new engineering education. J Electr Eng 5:144–146
3. Xie H, Tang L, Tang J (2015) Reform and practise of curriculum system majored in integrated circuit. Educ Teach Forum 34:76–77
4. Xu X, Shen Y, Zhong S (2020) The exploration and practice of innovation-type talents cultivation and mode of new engineering education. High Eng Educ 2:18–24
5. Yang T (2020) The talents cultivation of engineering practical capability majored in electronic information——from the view of engineering education accreditation t. Mech Electr Technol 3:111–114