Designing an Artificial Intelligence Platform to Assist Undergraduate in Art and Design to Develop a Personal Learning Plans

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Abstract. This paper presents the initiative design research for developing a platform based on artificial intelligence technology. Though the platform, the students can be assisted to develop a personal learning plan and register for the courses they need. Follow the blooming of information technology; Artificial Intelligence begins to intervene deeply into different industries in China. Change people's life and work in considerable ways. In order to cultivate talents that adapt to the new type of social structure, the university continues to reform and innovative in the cultivation and teaching mode. In this paper, we put the emphasis on the introduction of personalized learning plan development and the learning information service system. The information service model will create new learning mode and opportunities to constructing students' knowledge structure. We design a learning information service platform for undergraduate. Though the platform, the student can be assisted to develop own learning plan based on own interest and career path. The AI system will recommend courses plan and schedule. In addition, the system can estimate the knowledge points required and time spent by different learning routes. The learning information service platform based on AI system and the new learning mode is showed as examples, and hope to provide a new framework for the further innovation in higher education model.

Keywords: Information service platform · Learning mode · Artificial intelligence · Higher education model

1 Introduction

Revolution of education goes together with technology development and the transformation of production relations, and is always motivated by promoting Teaching & Learning Intelligent Recognition Technology, Learner Tracing Technology, as well as Artificial Intelligence Technologies based on individualized learning process. In recent years, the prosperity of the new generation Artificial Intelligence and the application of 'Artificial-Intelligence Plus' teaching method have revealed an upcoming area for education that features individualized learning experience, visualized learning process, integrated learning assessment, and socially-oriented study, in which new personnel

training model and frame can be developed on the strength of big-data technology and education big-data analysis.

As suggested by Design Education in 2013, until November 2012 a total of 1,917 institutions of higher education in 31 provinces, cities and autonomous regions of China had offered design-related education and over 574,000 students got enrolled, among whom over 303,000 were undergraduates. According to the latest statistics, in 2018 the number of institutions has risen to 1,928 where 8,208 relevant majors are available among which 4,670 are opened in general undergraduate colleges and universities. As the number of students majoring in art and design has boosted dramatically, it is expectable that more occupations are needed for those graduates, although not all of them will engage in major-related jobs. 'The essence of education is not teaching fact, theories or principles… not even to turn students into professionals. It is rather to broaden students' horizon and inspire and enlighten them even by overturning stereotypes', said Robert M Hutchins, the former principal of the University of Chicago. Therefore, the undergraduate Art Design education, whether its management or teaching mode, should focus on how to present students with a 'bigger picture', a diversified and flexible learning platform, open and tolerant environment, thus to contribute to their sustainable and overall development. As a result, the current uniform training mode can no longer work any more. The students should choose their own learning path according to their personal career development plan.

The Artificial Intelligence Market in the US Education Sector 2017-2021 report suggests that experts expect AI in education to grow by '47.50% during the period 2017–2021.' This program is aimed to establish a platform with artificial intelligence and big-data analysis where study guides are accessible for Art Design students—learning statistics extracted from individuals are analyzed so as to provide study suggestions in accordance with students' future career plan by which certain qualities are demanded, thereby to minimize the barriers between different fields and help students make their own study plans from a more general perspective.

2 Research Context and Concepts

While the fruit of information era, information technological revolution is changing people's production mode and life style in a profound manner. During the 40-year information age, we told computers what to do. With advances in artificial intelligence, particularly machine learning, and faster processing chips we can feed computers giant data sets and they can draw some inferences on their own. The rise of code that learns marks the beginning of a new era of augmented intelligence. It's a great opportunity for us to expand access to a great education and for students to make a big contribution. Individualized training towards Art Design students has become both a great challenge and a requirement for institutions of higher education that are eager to keep pace with the times.

2.1 Current Art Design Education in China

Nowadays in China, it is possible to study Art Design in approximately 2,000 colleges and universities where generations of smart and creative designers have been cultivated, which is somewhat reflective of the burgeoning design education. While the traditional Bauhaus teaching mode is obviously impossible to adopt any more considering the annual increase of the number of Art Design students, volume and uniform training can be more detrimental to the future development of individuals, in which sense it is in the long run both urgent and beneficial to inspect and make adjustment to the current education mode.

2.2 Current Training Mode

In China, the traditional way to training Art Design students was mainly derived from the Bauhaus teaching system—students, whether majoring in Design or not, have to take courses in conformity to the training program already fixed. In recent years however, institutions of higher education have done some change to allow free choice of courses in the first year regardless of any barriers, so that students can choose what they are really interest in as their major in the second year when the real professional training begins. Provided undergraduate Art Design education is however not only to cultivate applied talents proficient in craftsmanship, which is somewhat less than satisfactory, but to breed creative talents with broader view, the secret of success at this stage is then to encourage philosophic thinking, self-enrichment, and self-exploration rather than to impart knowledge. Even for those who do not engage in design after graduation, which will benefit them for the whole life.

2.3 Problems with Student Training

Among 638 graduates chosen randomly from those of applied universities and colleges majoring in Art Design, 45.6% engaged in professional counterparts; even for them only 19.1% appeared interested in their occupations but showed a proportion of 95.2% satisfaction towards the training given in universities. For those whose job is neither relevant to their major nor attractive for themselves, the satisfaction rate reached 61.8% [1]. As a result, the learning objectives of and enthusiasm about undergraduate education can exert a direct impact on study quality and result, although the undergraduate education mode in China has not achieved a combination between major with interest, or career planning with teaching.

Therefore, to decide where to go in the future, one has to take overall development, interest, and industry development into account, hereby to make study plans and reasonable arrange for the course order and study direction of each step (Fig. 1).
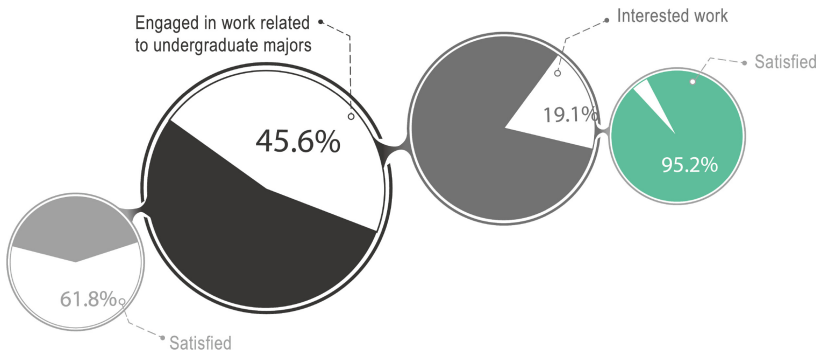
Fig. 1. Student satisfaction survey

3   Design Framework and Process

To re-understand what part education plays at every stage of one's life is of great importance in this Artificial Intelligence era. Education is never just about knowledge accumulation, but is to encourage self-recognition and world-exploration, thus to inspire students to positively, automatically and consistently acquire knowledge, to make decisions and solve problems innovatively when encountered with them, and to keep their taste, view, and thought in pace with the time. That is just the direction in which undergraduates should be cultivated.

Based on Artificial Intelligence technology, big data and perceptive technology, our Undergraduate Learning Platform is aimed to present new teaching method for individuals whose information has gone through full analysis. While the relationship between students, teachers and education administrators get redefined, the whole education process, a service provision system in other words, can be knowledgeable, visible and controllable, which should do help to students who want to know their capacities, strengths and shortcomings, and desire an individualized teaching plan and unique learning experience after learning about what they really want in the future.

We efforts to meet individual students' needs. Students' learning objectives, pace, and content are likely to vary to a greater extent. The idea behind AI platform is that personalized instructional approaches and strategies will improve student outcomes in the short term (e.g., stronger rates of growth in achievement) and in the long term (e.g., successful completion of a postsecondary degree or successful transition into a career).

3.1   Personalize Educational Path for Students

AI platform can deliver slightly different versions of the curriculum based on data that has been collected from their past performance on tests, quizzes, and other school work. A study conducted by Rand Corporation confirms that such personalized learning indeed improves the individual performance. Students, who followed custom lessons plans performed by 3 percentile points above the median in maths and reading, when compared to peers who were taught based on standard curriculum.

Of course, this concept can expand beyond the classroom. Artificial intelligence can even help create recommendations for students as they select classes, even choose universities. The personalization of the learning experience is indeed the first great ongoing transformation of the educational system.

1. Learner profiles maintain a rich and up-to-date record of student strengths, needs, goals, and progress.

Highlight student's academic analysis. Thanks to big data, it has become possible for universities and colleges to collect information about students' learning condition from multiple channels and various perspectives, which is vital to develop positive vocational values. In that way, teachers can know students better by tracing the history left of web platform (can be reflective of students' study attitude, professionality, and interest) or via the interaction between the two parties, so as to realize the shortcomings of students more accurately and adjust teaching methods, or exercise intervention and surveillance.

2. Personal learning paths provide appropriate and meaningful choices of course for each student to work on, with the necessary teacher supports.

Highlight individual experience. Career planning education based on big data can present students with an objective and just assessment and analysis of subjective and objective conditions, and of the balance between strengths and drawbacks, which should guide them to set feasible career goals suitable in this era and further arrange their learning path.

3. Competency-based progression enables these personalized paths to run their natural course.

By conducting a comparative analysis over personal capacity and goal competence, students' concentration can be directed to where lies their interest, so as to naturalize their learning path.

4. Flexible learning environments enable schools to allocate resources in new ways to best support these processes.

Highlight individualized teaching. Development of students' professionality and individualized teaching mode, rather than to impart knowledge, is the core to talent cultivation. Besides, the application of Internet has freed education from the limits imposed by time and space. Hence, online teaching platform is increasingly helpful to both teachers and students by providing massive teaching resources and rendering it possible to analyze students' performance, which is the basis for doing individualized teaching.

3.2   Learning Model

We hope that in the future students will have an AI lifelong learning companion. Essentially, this next generation of students will grow up with an AI companion that knows their personal history and school history. Therefore, it will know each student's individual strengths and weaknesses.

Our learning model is mainly comprised of three parts [2].

1. Students' personal information.

A student's online learning history can be reflective of his/her knowledge base, capacity indicators, interest and hobbies, as well as study habit.

2. Career information.

To analyze those engaging in a certain design-related field with big data, including their ability distribution, character strengths, social groups, learning path, and career planning.

3. Course platform.

To analyze the nature, knowledge objectives and ability goals of those courses in universities and colleges, besides which previous teaching content and practice, key and difficult points thereof as well as students' evaluation and comments are also accessible.

It is for students to set their own career goals based on what they like or what they want to fight for in the future. At the next stage the features of relevant occupation can be contrasted with personal information to present an overall analysis of knowledge structure and ability structure, and be matched with university courses to calculate a learning path. During the whole period of undergraduate study, students are allowed to adjust their learning path according to the changes of their interest or experience.

About the AI learning service Platform, the set of expectations and standards that students, teachers and staff follow in school.

– Motivated: students are self-driven, goal-oriented, exceeding expectations.
– Accountable: students are accountable for their own behaviors and actions.
– Knowledgeable: students learn and collaborate with peers and teachers.
– Encouraging: students inspire others through discussion and collaborative work.
– Respectful: students respect staff, community partners, peers and learning spaces.

Artificial Intelligence Learning Platform may clarify students' ability and characteristics, thus advice them about future career requirement, adjustment to expectation, and how to make learning path. By doing so, it would be easier for them to adapt to the society, face challenge, and make appropriate choice about their future plans (Fig. 2).

3.3 Design Touch-Point of AI Learning Service Platform

Our platform [3] is centered on students and their stakeholders. Information about students' learning process that is designed by 5 touchpoints contributes to the set of career goal and making of learning path at the next stage, hereby to enhance study efficiency, and present an individualized, flexible, and enjoyable learning experience. Those five touchpoints are as follows (Fig. 3):

1. Self-understanding [4]: Students via the platform can learn about their ability and habit. Before the professional undergraduate training, the system will conduct a full analysis about the student's sociability, expression ability, logic, imaginary thinking ability, practical competence, management competence, hobbies and skills based on all
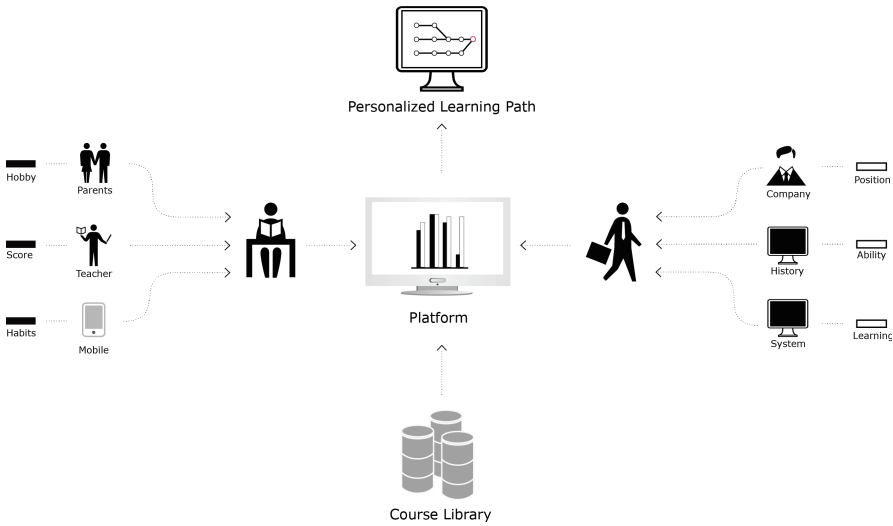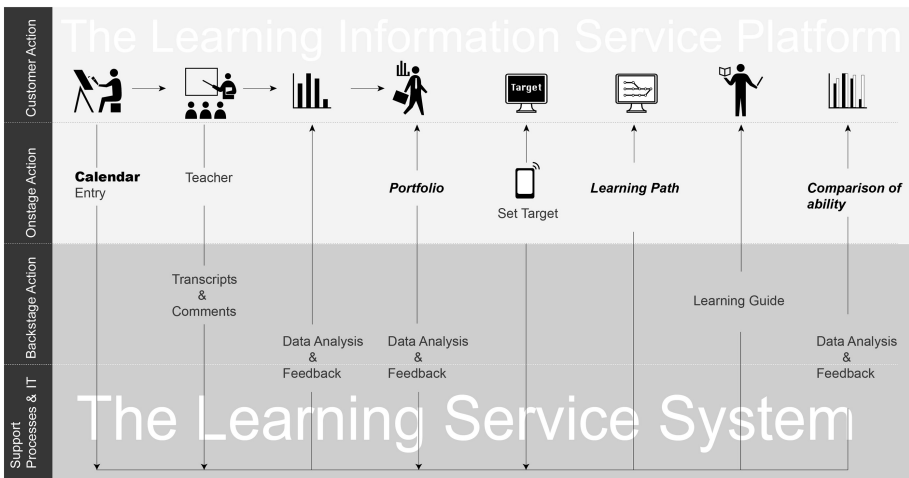
Fig. 2. The information service model

Fig. 3. The blueprints of the AI learning service platform

their training record and transcript, such as the drawing training, chess training, the scores of his/her mathematics and physics examinations in high school, all the prizes in contests, comments from teachers and so on. As comprehends as it is, students can form a better understanding about themselves. During the whole period of under-graduate study, our system will analyze students' professional competence according to their performance in the exams, such as basic modeling ability, design theory appli-cation and critical thinking, drawing performance, software application, design expression, design innovation, group communication, and project organization

competence. In addition, the system will get students' learning style based on date for homework submission, an duration to complete the homework, and how to search materials and the scope of searching (Fig. 4).
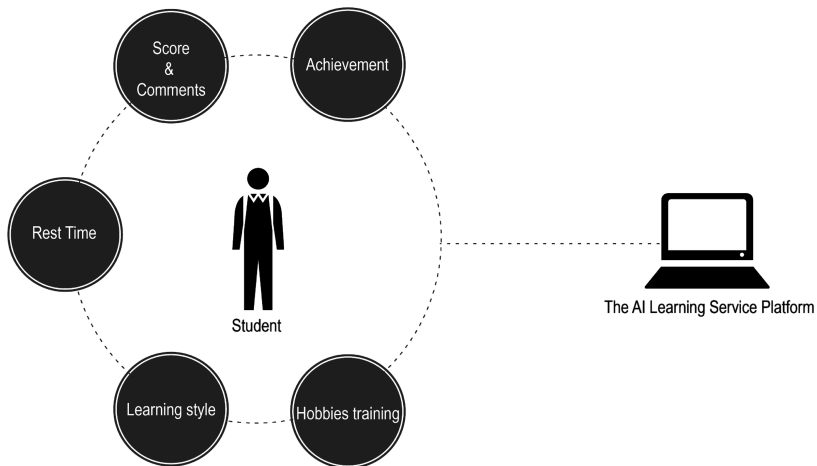

Fig. 4. The data collection model of students

2. Self-planning: A scientific and feasible career planning is the first step to success, which is the reason why a large number of institutions of higher education are opening relevant courses or holding public lectures about it; even so, the majority of Art Design undergraduates have not, however, got aware of what career planning really means. In that sense, our platform may deal partly with that problem by analyzing the competence of those engaging in that field and forming up their career development path. To take Design for Digital Media BA for instance, students can get a full understanding about that major by extracting the result from the platform. Good visual designers are usually between 22 to 28 years old, for whom what really matters is basic modeling ability, software application capability and design expression competence. Differently, product managers between 26 and 35, excellent in group communication, design innovation, and project organization are more likely to get highly recognized. Further, there generally exist two career development paths for product managers, which are visual designer—interaction designer—product manager, or web-developer—project manager —product manager. To summarize users are allowed to choose their own career goals or plan career development path based on their interest and enough information [5] (Fig. 5).

3. Self-learning: By making comparison between students' personal ability and their career goals [6], our platform will further propose suggestions about how to perfect the knowledge structure and practice structure, how to adjust directions and the meaning of each competence indicator. Moreover, the database will, taking into account the content, competence structure, and teachers of each course in that semester, recommend several learning paths for students. Every path has its own features, and
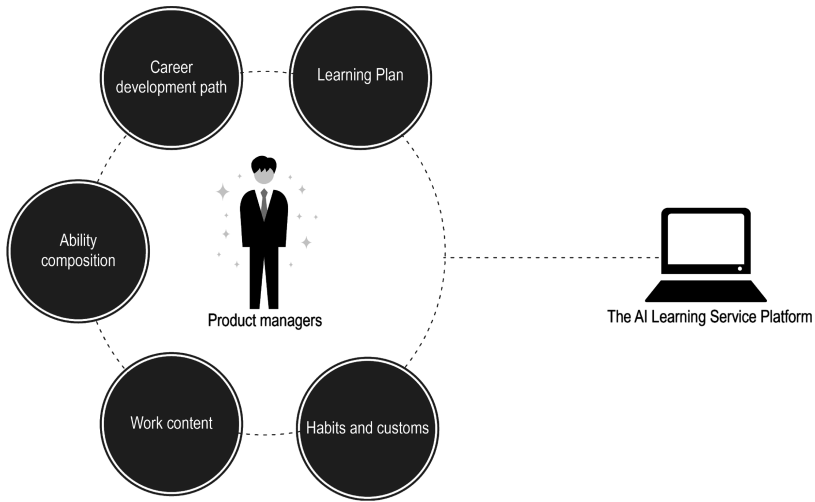
Fig. 5. The data collection model of target position

may differs with the other in duration, professionality, and knowledge scope, so that students may feel free to choose. When it comes to a clash between course arrangement, or a particular course is inaccessible due to special reasons, out-university courses or even E-courses may work to supplement knowledge gap and practice, thus to guarantee the completion of undergraduate study roughly in conformity with the learning path [7] (Fig. 6).

Fig. 6. The UI of ability comparison

4. Study guide: If you ask our students what classes they are taking and the meaning of taking those course, they might be confused, even for those who are about

to graduate. Generally speaking, to understand the position and importance of each course before putting our hands on it is of great significance, for that will improve study efficiency and enthusiasm, as well as inspire targeted learning. On that point, our platform not only points out the objectives and position of each course, but also assist to figure out the key and difficult points according to the individual learning path, thus to help students with finding out their targets. Students' performance can also get reflected on the score distribution. The accumulation of score will visualize the intangible competence indicators, hereby making it possible to observe one's progress and get a sense of achievement (Fig. 7).
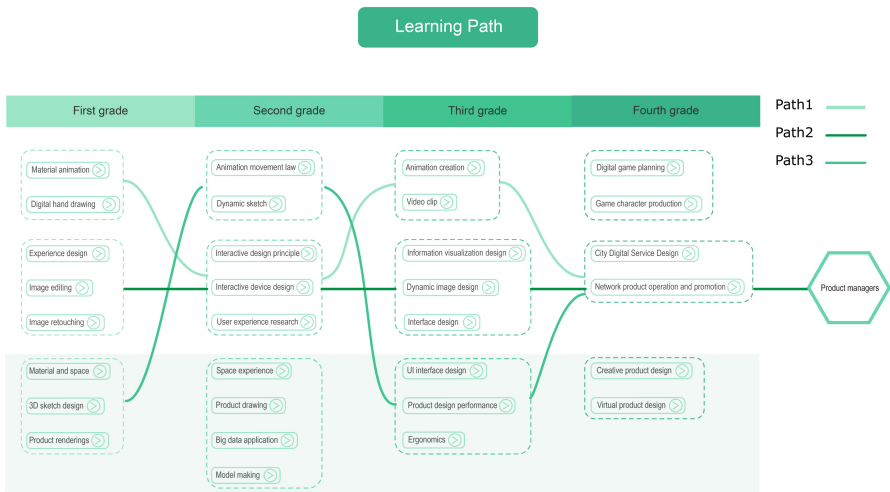

Fig. 7. The UI of the learning path

5. Teaching Aids: Big Data technology can play a role in supporting the complexity of the personalization process. When properly supported by teachers, it can help students learn independently and work at their own pace. Technology can also enable educators to take a more personalized approach in their teaching efforts and other activities they undertake to support student learning and development.

Artificial Intelligence era is an era when students' personal will gets fully respected, especially their free right to choose. Although the automatic request of students is predominant, teachers' guidance and help is still necessary. 'To let go students in this world saturated with information is never the best way; teachers are obliged to lead the way, tell them how to learn, and be supportive', said Tony Comper, the CEO of the Bank of Montreal. If teachers familiarize themselves with the situation of students before class, they would be able to adjust the teaching plan and reset the key and difficult points. Of course, individualized suggestion and support can also be achieved in that way.

4   Conclusion and Future Work

To change the passive talent cultivation mode in China is, in light of the long periodicity to breed talents, not only to reform the way in which higher education is conducted, but also to reform from a comprehensive perspective how the recipients live– from infancy and preschool period to undergraduate study period and even their whole life—a delicate and detailed design is all the way needed. Art Design needs education, and education needs design more.

AI can reshape education with its potential to impact educational policy on local, national, and international scale. In our proposed work, we sought to identify a framework that is complete in its representation of the information flow, elements, and relationships and generic enough to support to education. The Data Service Model was a result of this vision.

And we shortly introduced the learning service platform based AI system that we design to improve the learning experience for undergraduate and satisfied individual, variety, dynamic requirements. Then we presented future learning model based learning information service platform.

As future work, our plan is to follow up the study on students who were admitted to Beijing City University in 2018, and also on graduates to develop a further understanding about the influence of undergraduate learning on different stages of future career. Their feedback is important to plan the directions for improvements.

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