The Construction and Analysis of Personalized Learner Model in the Context of “Internet Plus”

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Abstract: With the advent of the era of "Internet plus", personalized learning has become the manifestation of deep integration of technology and education in the advanced stage, Education big data, AI and other technologies support personalized learning. Education changed from education information 1.0 era to education information 2.0 era, from initial emphasis on the breadth of application of information technology and the popularity of information technology in education to education ecological change and innovation of talent training model. That the digital education turns to wisdom education is becoming an important trend in education development worldwide. With the deep application of big data and learning analysis technology in education, we pay more and more attention to the personalized learning and development of learners. Among them, personalized learning system is the key to promote learners' personalized learning in intelligent learning environment. As the core component of personalized learning system, learner model represents a data structure of learner individual characteristics and can present the cognition of learners from system. Different learners have different social backgrounds, cognitive bases, learning styles, learning preferences etc., their learning ability is different. The system which support personalized learning needs to identify differences between learners and establish an operational and effective learner model. This paper aims at the main problems existing in the existing learner model, build the Internet plus education personalized learner model. It includes data layer, analysis layer and application layer, and four modules: the student behavior analysis, learning evaluation analysis, student emotion analysis and classroom performance analysis. This model can obtain dynamic information of learners and timely provide learners with appropriate application service support. This model uses education data mining and multimodal learning and analysis technique to solve problems such as single student characteristics and lack of detailed analysis of student information. This model provides a basis for learners' personalized support services, effectively improves learners' personalized learning effect, and promotes personalized development of learners.

Keywords: Internet plus, personalized learning, learner model, personalized development

INTRODUCTION

With the advent of the era of "Internet plus", Education big data, AI and other technologies have been widely used in education, that the digital education turns to wisdom education is becoming an important trend in education development worldwide. Education changed from education information 1.0 era to education information 2.0 era, from initial emphasis on the breadth of application of information technology and the popularity of information technology in education to education ecological change and innovation of talent training model. The way of learning in the 2.0 age has changed, the fusion of information technology and education is undergoing a qualitative change. Personalized learning is the manifestation of deep integration of technology and education in the advanced stage.

In recent years, with the deep application of big data and learning analysis technology in education, we pay more and more attention to the personalized learning and development of learners. Among them, personalized learning system is the key to promote learners' personalized learning in intelligent learning environment. In NMC Horizon Report: 2017 Higher Education Edition, personalized learning is a difficult challenge, ALT (adaptive learning technology), mobile learning, IoT (internet of thing), NGDLE (next-generation digital learning environments), AI (artificial intelligence) and NUI (natural user interface) are listed as an important technology [1]. As the core component of personalized learning system, learner model represents a data structure of learner individual characteristics and can present the cognition of learners from system.

Different learners have different social backgrounds, cognitive bases, learning styles,

learning preferences etc., their learning ability is different. The system which support personalized learning needs to identify differences between learners and establish an operational and effective learner model. In order to build the Internet plus education personalized learner model, this paper analyzes the current situation and problems of the learner model domestic and overseas, and combine the relevant theories.

THE RESEARCH STATUS AND PROBLEM ANALYSIS OF LEARNER MODEL

The foreign learner models mainly include covering model, stereotype model, perturbation model, constraint-based model, Bayesian network student model, student model based on fuzzy theory, etc. [2]. The domestic learner models are classified from two aspects: on the one hand, which including a cognitive model, a deviation model, a covering model [3], on the other hand, it is divided into static model, dynamic model and evaluation and error diagnosis model[4]. According to the existing learner model, it is found that there are some problems, such as personal features are relatively single and Information ownership is too mixed and disorderly.

Personalized learner model is a vital function module in the personalized learning system. It is a model that characterizes individual attributes, cognitive structure, learning motivation, learning style, learning attitude and so on. It is also the key to realize the personalized learning. When constructing the model, we should not only consider whether the learner model can better adapt to the personalized learning system, but also consider the information dimension of learners' personality characteristics and the hierarchical design of the model.

THE CONSTRUCTION OF PERSONALIZED LEARNER MODEL IN THE INTERNET PLUS EDUCATION CONTEXT

To build the Internet plus education personalized learner model, first is to clarify the elements that make up the learner model, that is, learners' personality characteristics and basic information. This paper records learners' learning process, learning skill, knowledge ability and learning mode according to CELTS-11 learner model specifications, and then get the basic information of the learner, at the same time, from the perspective of psychological cognition clarifies the dimensions of learners' personality traits, improve the system of learners' personality traits. The second, this paper is based on constructivism and behaviorism, using education big data and multimodal learning analysis technology, and collecting and sorting out the behavioral data of learners' participation in learning activities. It obtains the data of student participation from four aspects: student behavior, learning evaluation, student emotion and classroom performance. And then , this paper analyzes the contents systematically , in this way, learners' personality characteristics such as cognitive structure, learning style, learning motivation and learning attitude can be acquired. The purpose of constructing the learner model in this paper is learners with different personality traits are provided with appropriate personalized services and realizing teaching students in accordance of their aptitude.

The personalized learner model should include initialization database, and should acquire the dynamic data of learners' characteristics in time, and should use the correlation between each level to provide basis for personalized service. The personalized learner model designed in this paper consists of three modules: Data layer, analysis layer and application layer, as shown in Figure 1.

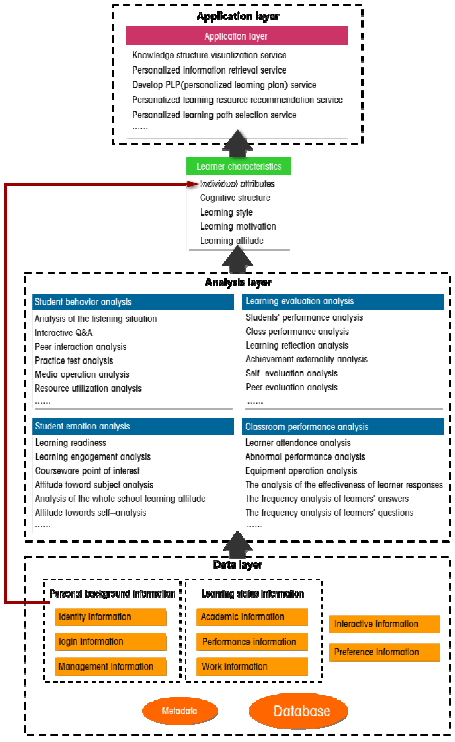

Figure 1 Internet plus education personalized learner model

In the data layer of this model, according to the learner information in the CELTS-11 learner model specification and combining the actual situation of personalized learning support service system, the learner information data of the personalized learner model is divided into four categories. First is personal background information, including identity information, this kind of information involves the privacy of learners, mainly including the names, ages, gender, birthplace and so on. The management information mainly includes the brief information of the learning center, level, major and enrollment batch

of the learner. The login information mainly includes the account number and password of all kinds of systems and other information about the learner's security certificate. Second is learning status information, including academic information, which mainly includes brief information related to learners' learning, such as entrance examination results, educational background obtained and course scores obtained. The information of works mainly includes the record of excellent performance of learners in various learning activities and online discussions, as well as the learning results obtained. Thirdly, interactive information, it mainly includes interactive information between learners and teachers, systems, other learners and learning resources. Fourth, preference information, it mainly includes information to promote personalized services, such as path selection preference, resource selection preference, etc. Among them, the acquisition of individual background information can directly form the individual attributes of learners' personality traits, that is, the initialization of personalized learner model. The other four types of information are dynamic and keep updating with the deepening of learners' personalized learning process.

In the analysis layer of the model, four kinds of dynamic information in learner information are analyzed at different levels. It mainly includes four aspects: student behavior analysis, learning evaluation analysis, student emotion analysis and classroom performance analysis. Each level of analysis includes various sub-dimensional analysis processes. The analysis of students' behavior includes analysis of the listening situation, interactive Q&A, peer interaction analysis, practice test analysis, media operation analysis, and resource utilization analysis. Learning evaluation analysis includes students' performance analysis, class performance analysis, learning reflection analysis, achievement externality analysis, self-evaluation analysis, peer evaluation analysis, teacher evaluation analysis, etc. Students' sentiment analysis mainly includes learning readiness, learning engagement analysis, courseware point of interest, attitude toward subject analysis, analysis of the whole school learning attitude, and attitude towards self-analysis and so on. Class performance analysis mainly includes learner attendance analysis, abnormal performance analysis, equipment operation analysis, the analysis of the effectiveness of learner responses, the frequency analysis of learners' answers, the frequency analysis of learners' questions, the skill analysis of solving problems, etc. Among them, the analysis of learning evaluation has great influence on the cognitive structure of learners, the analysis of student behavior has certain influence on learners' learning style and learning attitude, the analysis of students' emotion has certain influence on their learning motivation, learning attitude and learning style, and the analysis of class performance has a great influence on learners' learning attitude. And the determination of these four learner characteristics will directly influence the personalized service effect of the application layer.

In the application layer of the model, according to the learner characteristics in the analysis layer, this paper provides personalized application service for learners, and mainly includes five application services:

First is knowledge structure visualization service. The human brain is better at analyzing and processing visual images than text [5]. Common forms of expression are thought mapping, semantic network, concept map, etc. This service provides learners with an interconnected knowledge structure, helps learners scan the knowledge structure quickly, and make learners learn in a timely manner according to what they don't know.

Second is personalized information retrieval service. This service can push the right information for learners in both directions. It can not only analyze learners' learning needs and push learning resources for learners, but also filter some information.

Third is develop PLP(personalized learning plan) service. Learners are analyzed in three dimensions by using learning analysis technology. It can master learners' learning emotion, learning behavior and learning performance. PLP mainly includes learners' resumes, learning goals, implementation plans, learning reflections, and plan revisions. According to the personal interest,

the preference for personalized learning plan, learners choose different courses and practice, take part in the activities of different learning. They can interact with learners of different grades, and discuss the courses and experiences they need to develop their careers and achieve their goals. Each week, learners have 20 minutes of online consultation and guidance for PLP, through one-to-one communication with teachers, they can timely thinking progress and adjust the plan. This service helps learners to effectively apply SMART (Specific, Measurable, Achievable, Relevant and Time-bound) framework to their learning life, thus making the classroom active and full of vitality, and it allows learners to see their future plans and make changes at any time.

Fourth is personalized learning resource recommendation service. Personalized learning resources include resource contents, resource type (text, multimedia, pictures, logs), resource source, resource operation (downloading, uploading, deleting, updating, sharing, viewing, transferring, subscription, collection, commenting). By test scores, examination results, homework, learning path, interactive frequency and number of speech data determine the state of learning and individual inclination, it quickly locates the learning resources needed by learners and recommends appropriate learning resources for learners. If the learner knows the current knowledge

point, the system will push the next one. If the learner has not learned the current knowledge point or has a poor command of it, the system will provide him with the current knowledge related to the knowledge point.

Fifth is personalized learning path selection service. In order to achieve learning goals, learners need to learn a series of sequential learning objects, which constitute the learning path of learners [6]. Individualized learning path refers to providing individualized resource learning sequence according to learners' individual ability and situational factors, so as to improve the learning efficiency of individual learners [7]. At present, there are many personalized learning path recommendation methods. By judging learners' learning motivation and learning style, this paper suggests suitable learning paths for learners and helps learners complete the knowledge construction better.

In conclusion, data layer is the basis of personalized learning model, the analysis layer is its main module, and application layer is the value embodiment of data layer and analysis layer, the three are inseparable.

SUMMARIZE

The Internet plus education personalized learner model studied in this paper analyzes the learners' basic information, learning state, personality characteristics, classroom problem behavior and family situation, provides personalized service for the learners, helps learners to correct the erroneous zone of learning, assigns learning resources reasonably, and provides personalized learning guidance. This personalized learner model can also help teachers to strengthen psychological counseling for individual learners in time, and then improve the effect of classroom management. Based on this research, the follow-up will further improve the personalized learner model, so as to better promote learners' personalized learning.

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