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Metaverse and Future Education

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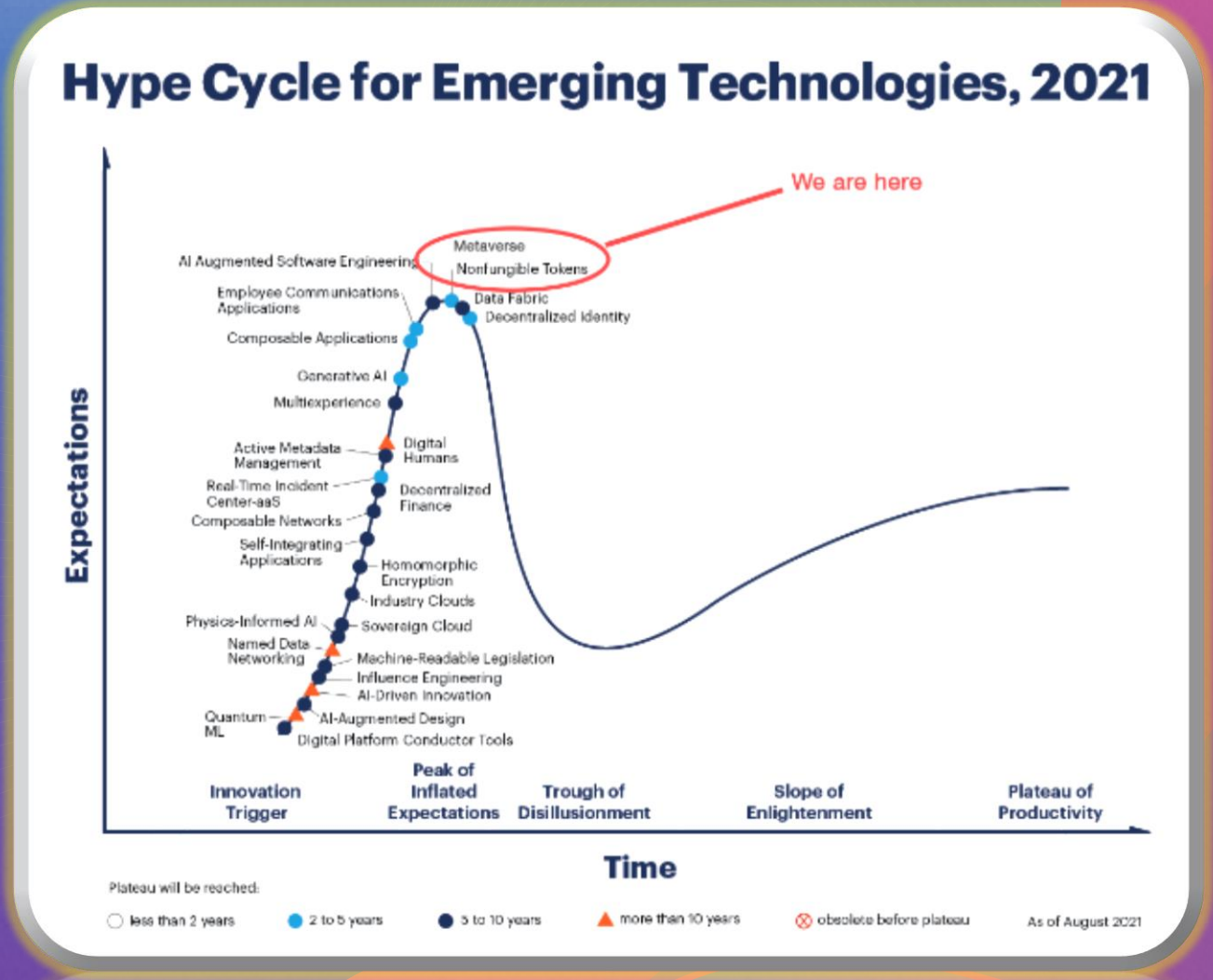
No Doubt, There Is A New Hype !



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WHAT IS IT?

Metaverse

From Wikipedia, the free encyclopedia

For other uses, see Metaverse (disambiguation).

A **metaverse** is a network of 3D virtual worlds focused on social connection.[1][2][3] In futurism and science fiction, the term is often described as a hypothetical iteration of the Internet as a single, universal virtual world that is facilitated by the use of virtual and augmented reality headsets.[4][1]

The term "metaverse" has its origins in the 1992 science fiction novel *Snow Crash* as a portmanteau of "meta" and "universe." Various metaverses have been developed for popular use such as virtual world platforms like *Second Life*.[5] Some metaverse iterations involve integration between virtual and physical spaces and virtual economies,[1] often including a significant interest in advancing virtual reality technology.[6][7][8]

Avatars socialising in the 2003 virtual world *Second Life*

The term has seen considerable use as a buzzword[4][9] for public relations purposes to exaggerate development progress for various related technologies and projects.[10] Information privacy and user addiction are concerns within metaverses, stemming from challenges facing the social media and video game industries as a whole.[11][4][12]

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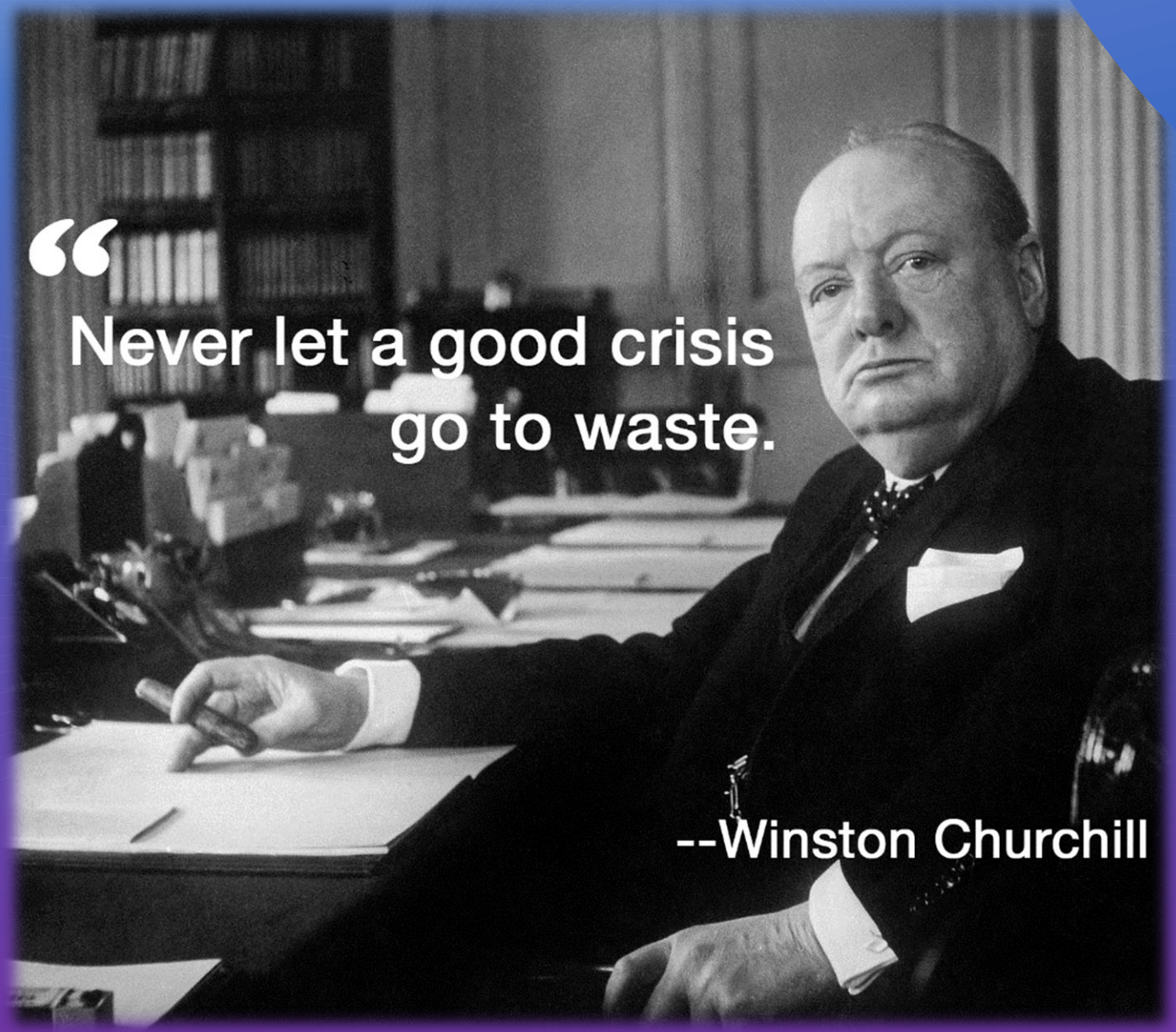
Why Now : Post Pandemic Society

A new norm enabled by the advancement of technologies, social development and new economy models



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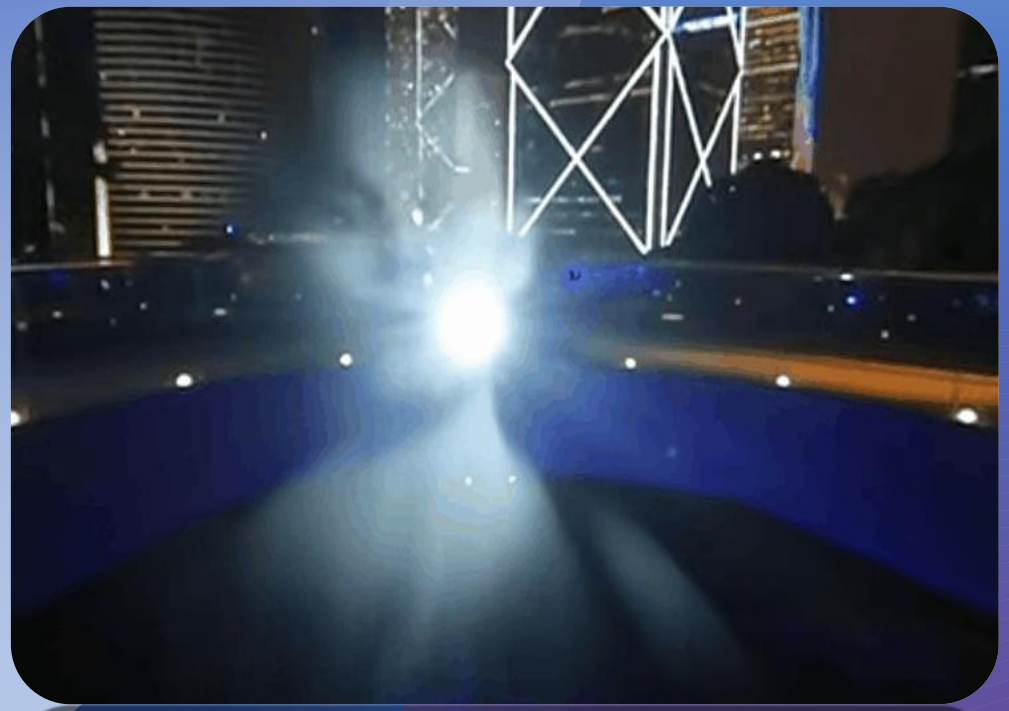

What We Have Learned from the Pandemic

- This world is at the beginning of the zero-distance era, and the energy of information is replacing the physical energy
- A distributed social unit can be instantly organised and managed across the Internet
- Data carries the energy of information and the emerge of data capital marks the advent of networked knowledge economy (data capitalism)
- Our networked society is a mixed physical/virtual worlds where AI enables virtual objects equipped with intelligence
- Human-machine intelligence symbiosis has created a new social norm

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Distance and Civilization

New civilization with Zero Distance Society

Mobile Internet/Cloud Computing/Mobile Phone

The number of people that an individual can contact in a unit of time

Information civilization

Computer/Optical Fiber/Internet

4500 BC: Wheels, our greatest invention...Man's greatest invention will become fundamental to transport and later to agriculture, industry and the world in which we live today

Industrial civilization

Steam engine/train

Agricultural civilization

Wheels/carriages

Prehistoric civilization

Some parts are characterised as Metaverse

Individual/Family | Group/Village | Enterprise/City | Society/Globalisation | DAO/???

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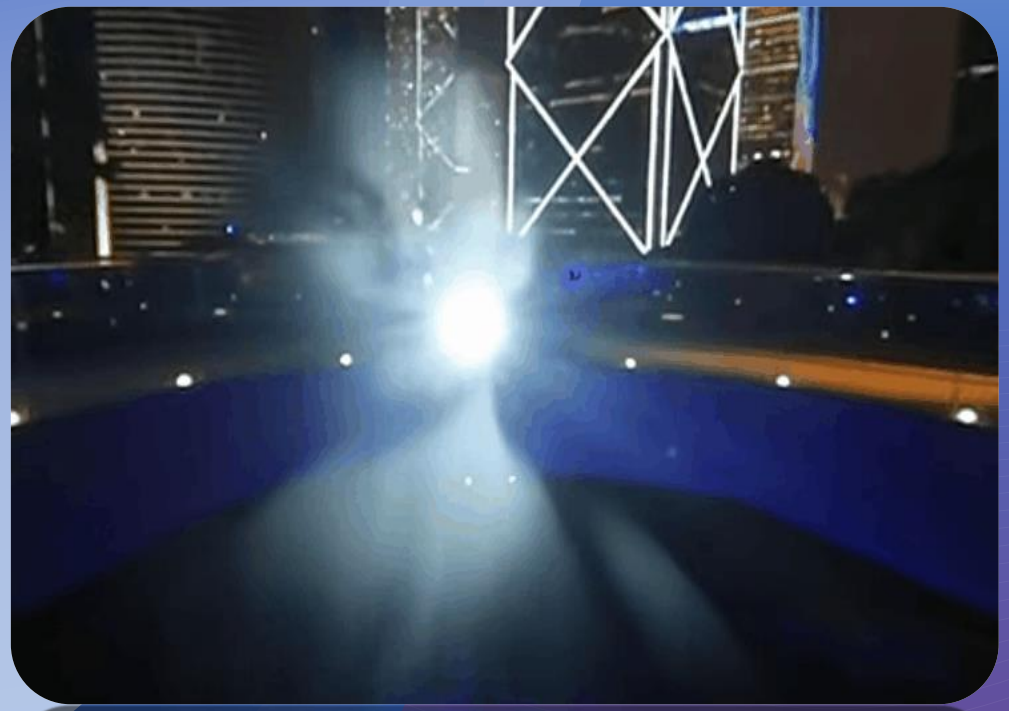

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DAOs provide an operating system for open collaboration. This operating system allows individuals and institutions to collaborate without having to know or trust each other.

Decentralized Autonomous Organization:

Organising

Flexible defining organizational structures, granting responsibilities and rights

Interaction

Effectively organizing free interactions

Resourcing

Efficiently generating , organizing, and allocating resources in an organisation

Membership

Accurately identifying the members of a group and protect all of their responsibilities and assets

Life cycle management

Maintaining the stability of all attributes of a group during its lifetime

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We need to build up a new Web of Value for the Zero Distance Society which support the DAO-based social structure, data economy with rich contents reflecting the virtualization of real world objects and environments

Web 3.0 : New Infrastructure for the Zero Distance Society

- Read only content
- Html-based

- Mobile Network
- Interactive
- Platform for building and managing 2D contents
- Read and writeable contents
- Java/python-based

- From mobile to immersive environment
- DAO support
- 3D content with behavior and intelligence
- Data asset building and management
- Blockchain-based

AI: Creating the Metaverse with Intelligence

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Like human to think

- Prediction & Reasoning

Like human to see

- Computer Vision (CV)

Like human to hear

- Acoustic Speech Recognition (ASR)

Like human to talk

- Text-To-Speech (TTS)

Like human to act

- Robotics

Like EXPERT to teach

- Smart Education

Like EXPERT to trade & invest

- Smart Trading & Investing

Like EXPERT to make medicine

- iDrug

Education in the AI-empowered Zero Distance Society

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Network-based Open Knowledge

Students can acquire knowledge freely on the internet

Virtual Classroom

Teaching units can be formed across the internet

Personalise Education

Teaching according to aptitude with the goal of nurturing creativity and critical thinking

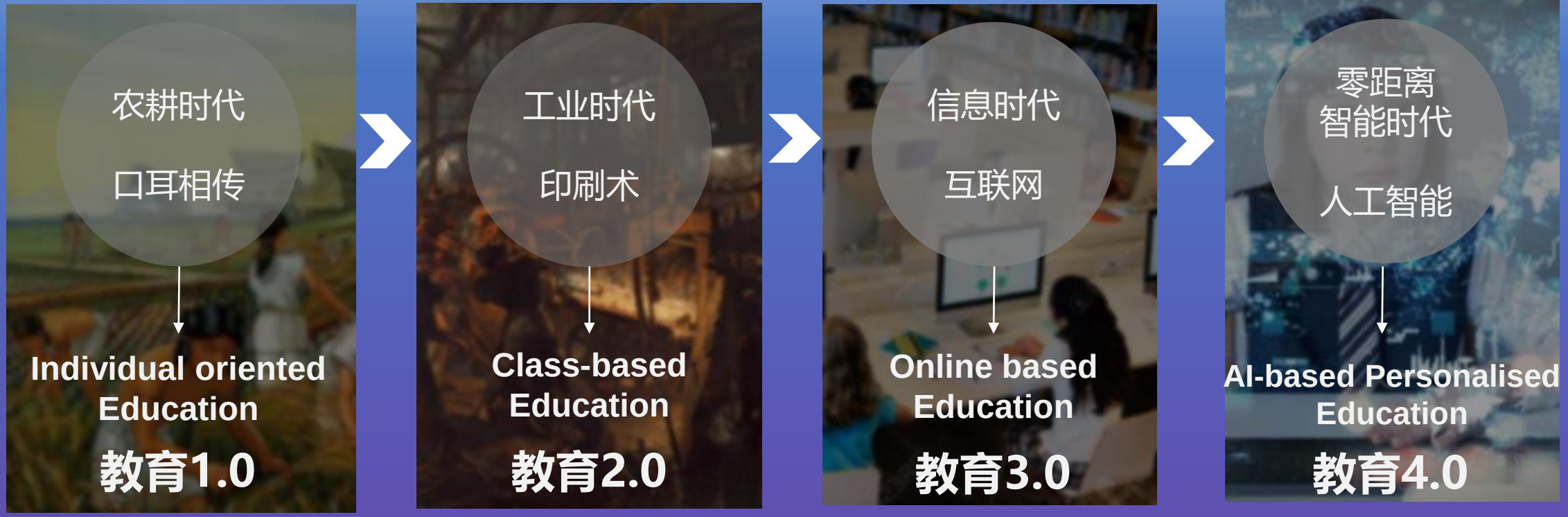
Computational Pedagogy

Big data and AI-based education environment and methodologies to support personalised education

'Hologram' lecturers to teach students at Imperial College London

November 5, 2018 | Telepresence Options

AI-based Personalised Education



- 2,000 years ago, Confucius set up a teaching altar, Plato founded a school, and the light of enlightenment was lit up in oral teaching. → Education 1. 0 era
- 500 years ago, the printing technology first appeared, bringing about major changes in the dissemination of knowledge, and the popularization of civilization took books as the carrier. → Education 2. 0 era
- 50 years ago, the Internet revolution was launched, subverting the existing face of information dissemination, and knowledge flowed rapidly in cyberspace. → Education 3. 0 era
- Today, the era of intelligence has begun, a data-based world is rapidly emerging, and data driven AI restructured the relationship between knowledge and people, so changes fundamentally education → Education 4. 0 era

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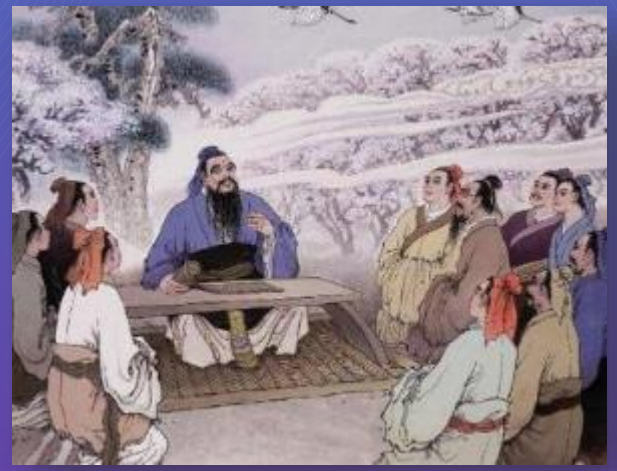
AI-based Personalised Education

Teaching According to Aptitude

One form for all

The weakness of industrialised education system



有教无类，因材施教

Educating without discrimination ,
and teaching according to aptitude

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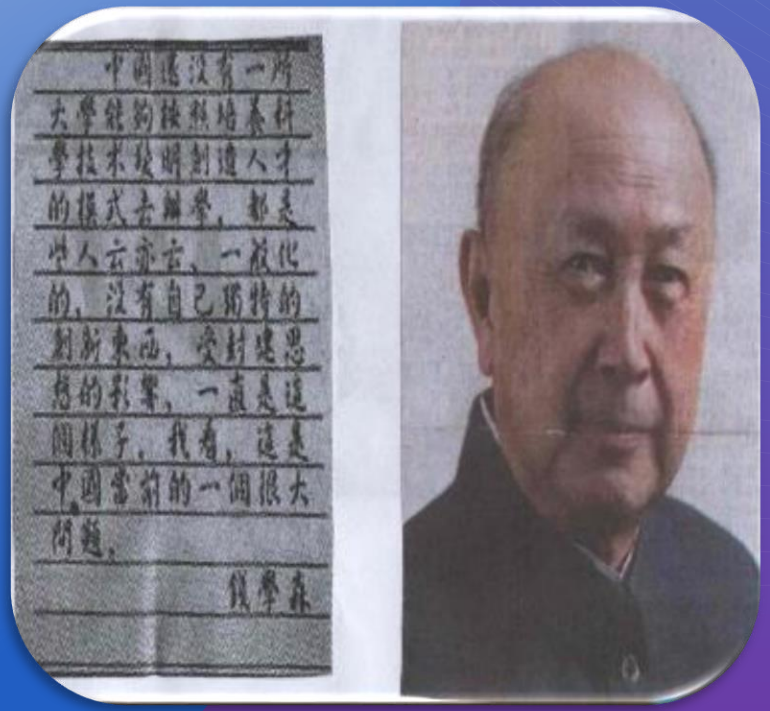
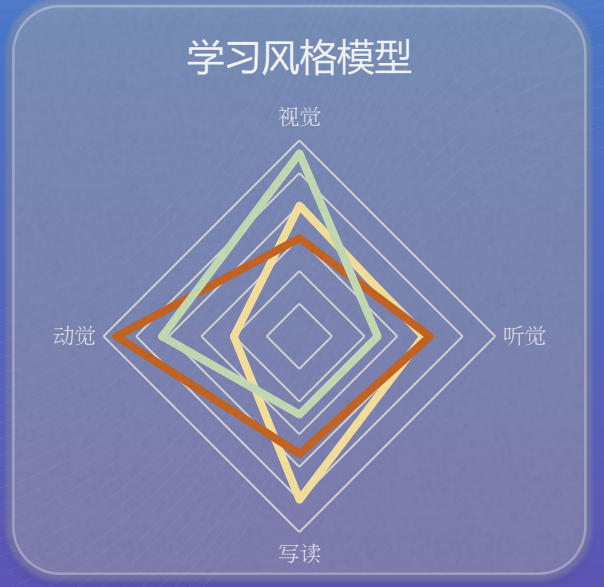
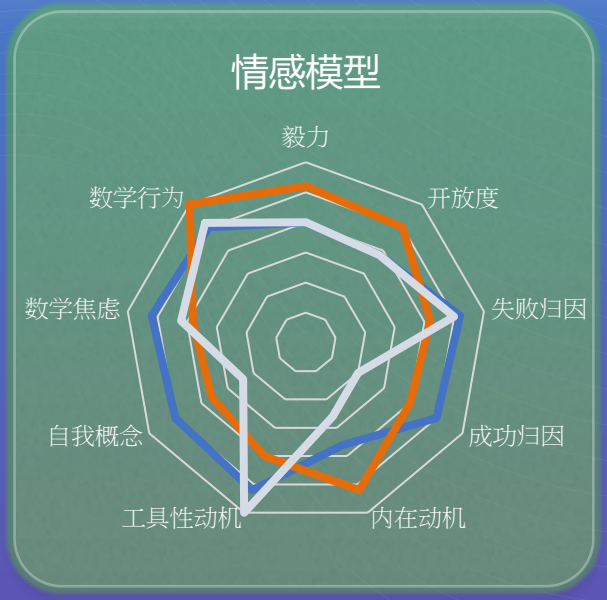
AI-based Personalised Education

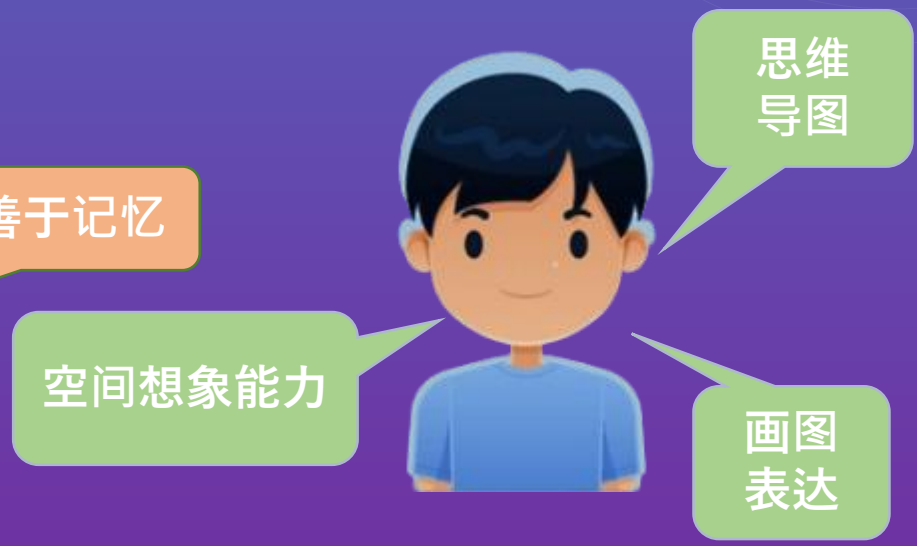
Nurturing Creativity



Personal Profiling with Big Data: Understanding Our Students







Gaining Insight on student's problem by AI Reasoning

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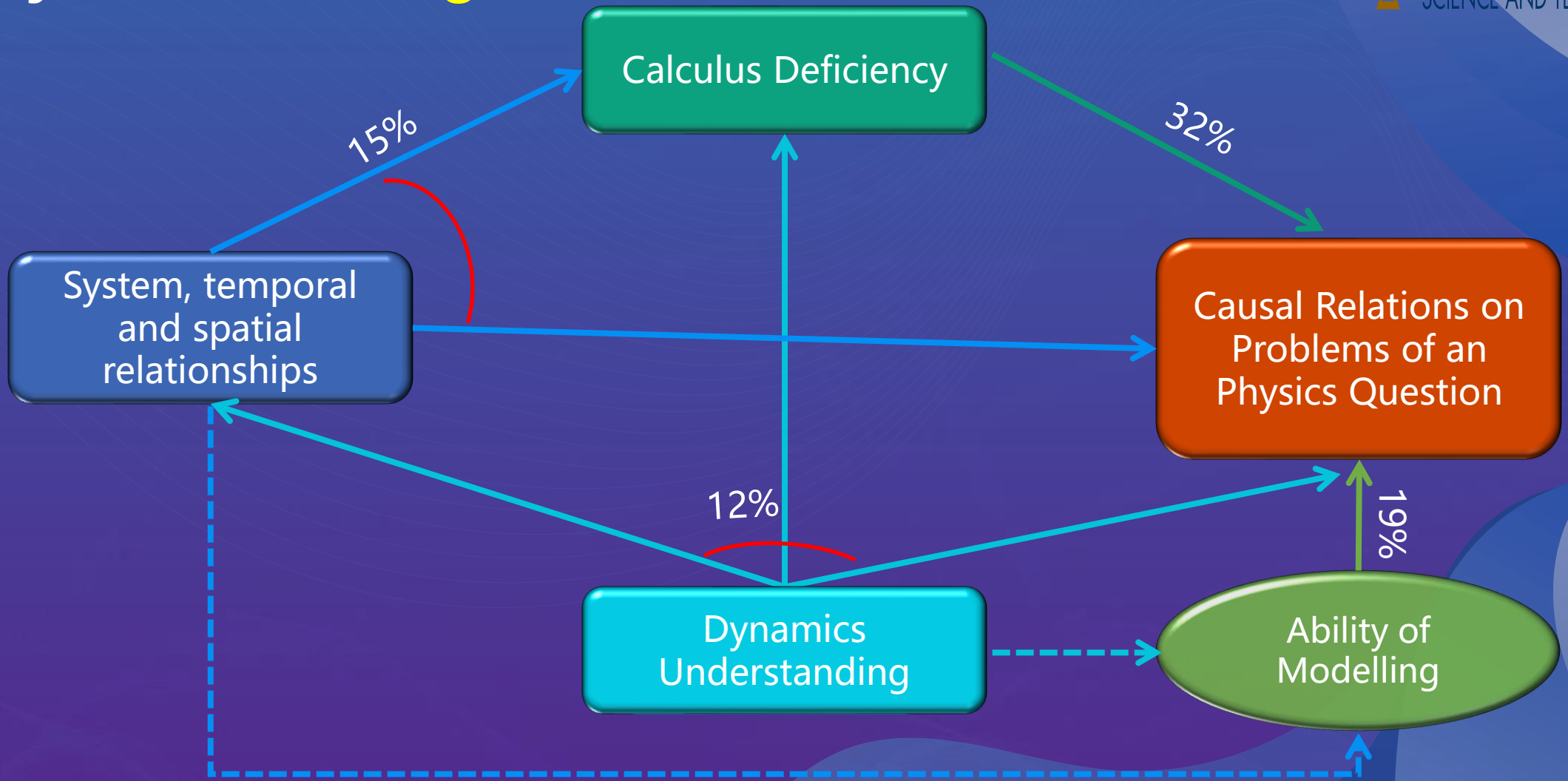

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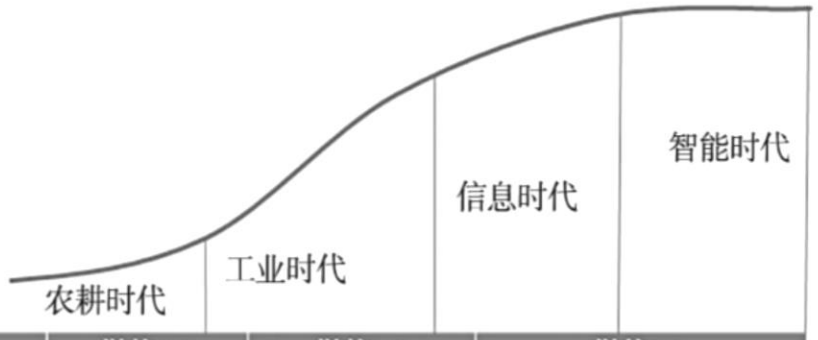


	学校1.0	学校2.0	学校3.0
动力系统	仕途/社会期许	职业期待与知识技能诉求	自我实现与社会适应
学习内容	典籍上的	口授的或社会建构的	社会建构、与智能时代相适应的
学习活动	吟诵，领悟	记忆，顺从，操练	建构，独立与协作，创造，体验
学习时空	固定时段学院/私塾	固定时段学校/培训班或部分在线	任何时间、任何地方
教学活动	讲授、启发	讲授	学习组织及学习促进
教师角色	权威	权威、管理者	辅助者、组织者、陪伴者
技术的作用	无	呈现的改善、内容的选择	情境及社会学习 准备评评估及智能学习管理

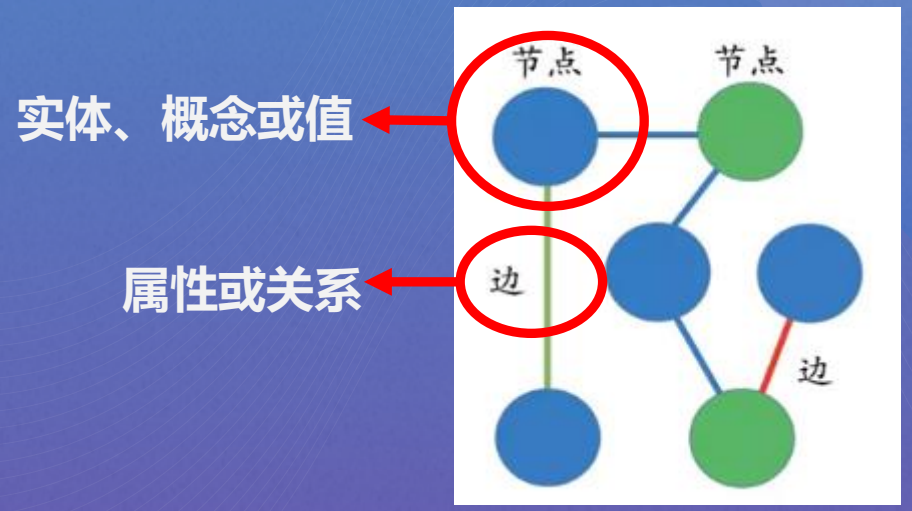
Towards the Era of Computational Pedagogy

The development of educational science has gone through three stages, one is the stage of **empirical pedagogy** based on doctrine and feeling, the second is the **experimental pedagogy** stage based on brain science, psychological experiments and other sciences, and the third is the computational pedagogy stage based on expert knowledge, big data and machine learning.

Education is moving towards the era of **computational pedagogy**, toward precision, toward science, toward individuality, toward efficiency.

Knowledge Graph

Knowledge Graph



- The origins of the knowledge graph can be traced back to a form of knowledge representation proposed in the 1960s, the semantic network.
- The Knowledge Graph is a new concept proposed by Google in 2012.
- As a representation of knowledge, a knowledge graph is a large-scale Semantic Network that contains entities, concepts, and the various semantic relationships between them.

Knowledge Graph:

Quantifying the Relationship between Subjects

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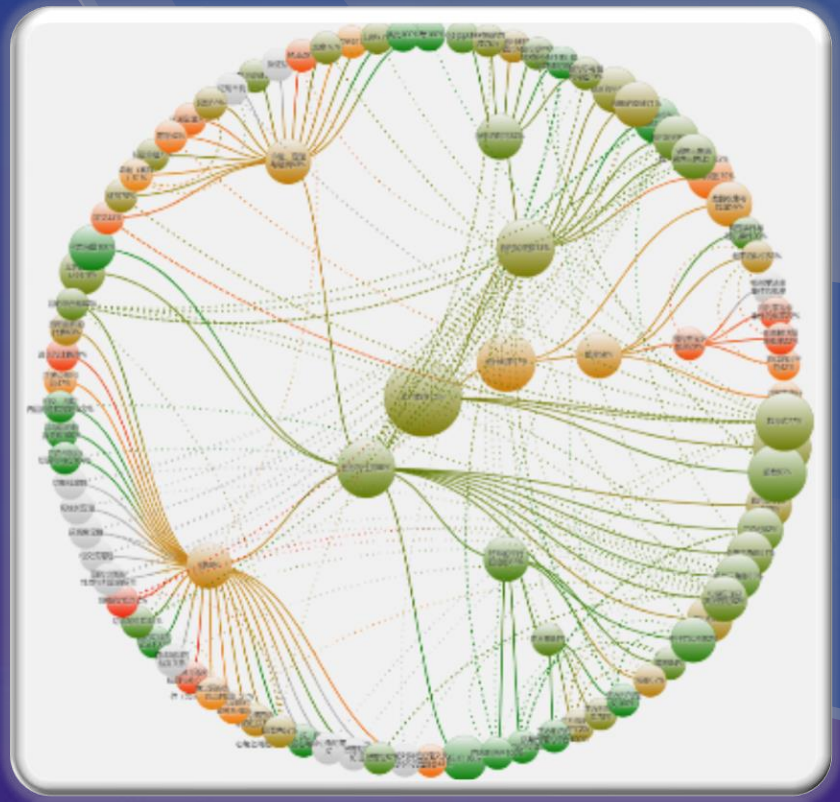
Color: The gradient from green to red corresponds to the change in mastery from high to low

The form of connection: The change from the solid line to the dotted line corresponds to the relationship between the knowledge points from intimacy to estrangement

Size of the circle: The size of the circle corresponds to the level of knowledge points from high to low

Knowledge graph initialized by expert experience



Knowledge graph evolved after learning from big student data

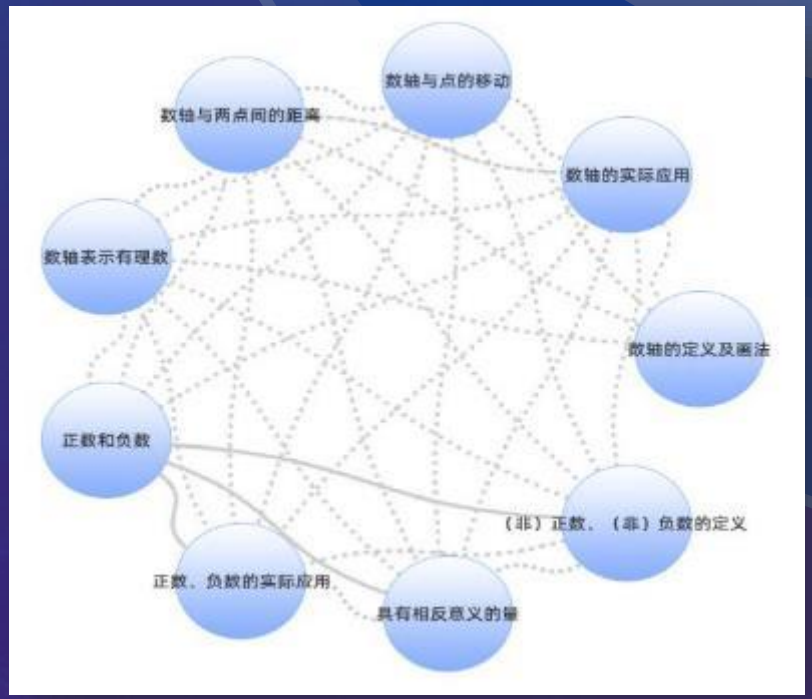
Knowledge Graph:

Quantifying the Relationship between Subjects

Knowledge Path Matrix (KPM): Measuring the relationship between the amount of information between any two knowledge points, and the correlation relationship having three characteristics: comprehensive, quantifiable, and feedback from both sides

选择知识点	(非) 正数、(非) 负数的定义	具有相反意义的量	正数、负数的实际应用	数轴的定义及画法	数轴表示有理数	数轴与两点间的距离	数轴与点的移动	数轴的实际应用	正数和负数
(非) 正数、(非) 负数的定义		0.12	0.11	0.00	0.01	0.01	0.01	0.01	1.00
具有相反意义的量	0.17		0.48	0.00	0.00	0.03	0.03	0.03	1.00
正数、负数的实际应用	0.21	0.61		0.00	0.01	0.03	0.02	0.02	1.00
数轴的定义及画法	0.00	0.00	0.00		0.06	0.10	0.08	0.05	0.00
数轴表示有理数	0.02	0.01	0.02	0.04		0.18	0.02	0.05	0.04
数轴与两点间的距离	0.01	0.02	0.01	0.01	0.05		0.71	0.20	0.02
数轴与点的移动	0.01	0.02	0.01	0.01	0.01	0.86		0.24	0.02
数轴的实际应用	0.02	0.04	0.03	0.02	0.04	0.56	0.56		0.04
正数和负数	0.53	0.37	0.29	0.00	0.01	0.01	0.01	0.01	

KPM for Selected Knowledge Points



The Corresponding Knowledge Graph

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Gamification and Experiential Learning:

Exploring Persoanlity and Establishing Self-Identity

Optimising Personal Learning Pathway based on Knowledge Graph

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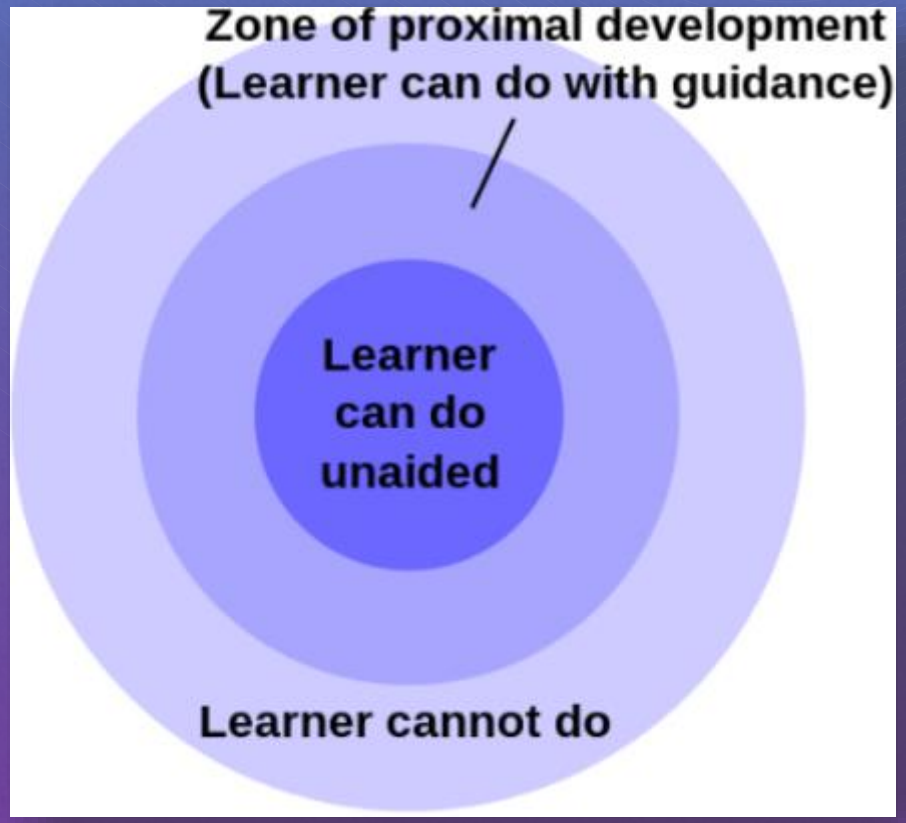
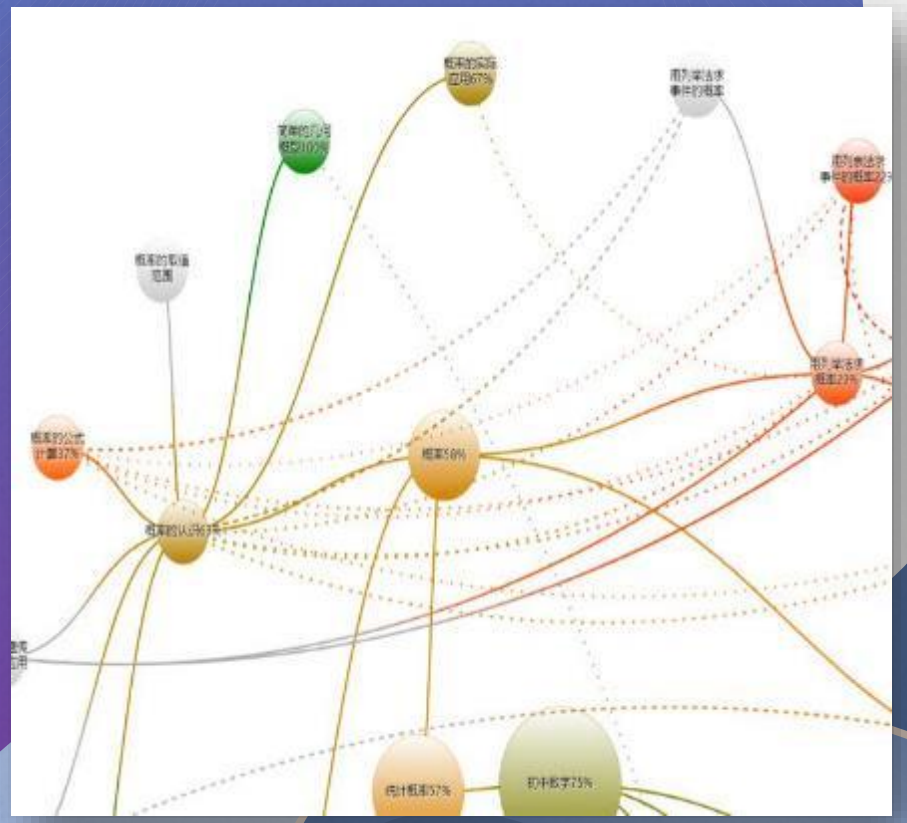
Utility of Optimization:

Maximising zone of proximal development (ZPD)





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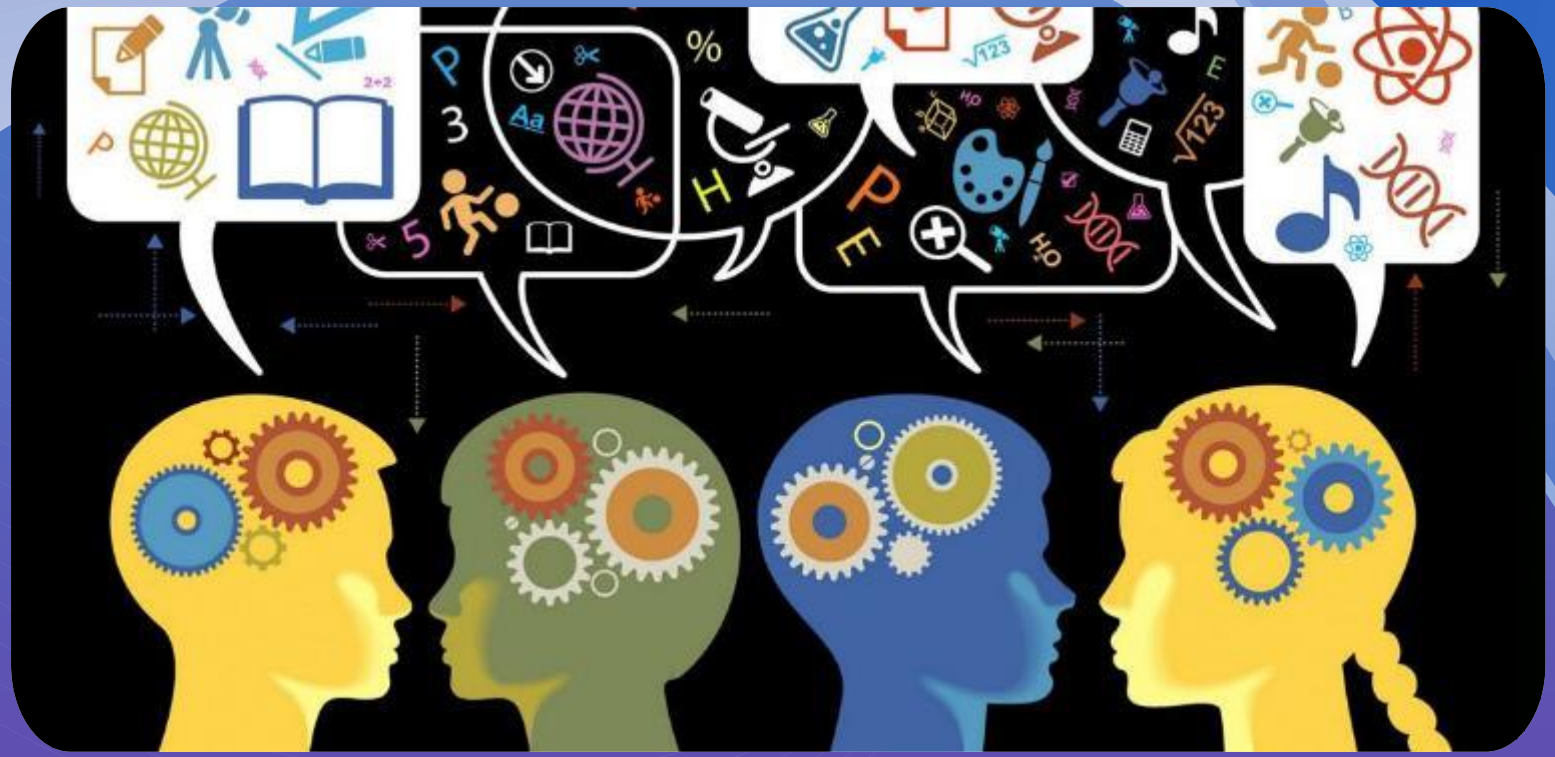

Critical Thinking Divergent Thinking

Nurturing Creativity

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The Technology such as Metaverse can

Provide an Unique Environment for Creativity

Education with Unlimited Potential

AI-Based Education Case Study: Shanghai Practice

Education Brain

An City AI Infrastructure for Education

知识大数据

名校名师

资源大数据

智能教研助手

教研智能化共享

教研智囊

知识图谱

智能教学助手

赋能广大教师

学习

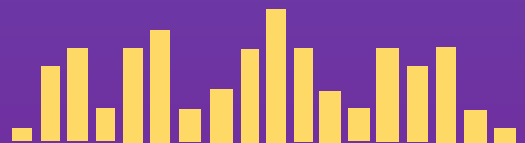
AI算法引擎

教育
大脑

智能学伴

以学生为中心

行为大数据



Five Years Plan for Serving 1.7 Million Students

2019年启动高中生物学科知识图谱
与智适应学系统研发

2020年全市教研会议上进行成果展示

上海市宝山区率先试点，
推动全面应用

建设投入

2019

2020

7所高中验证效果

试点成功

全区推进

2021

数字化转型示范区20万学生
常态使用

2022

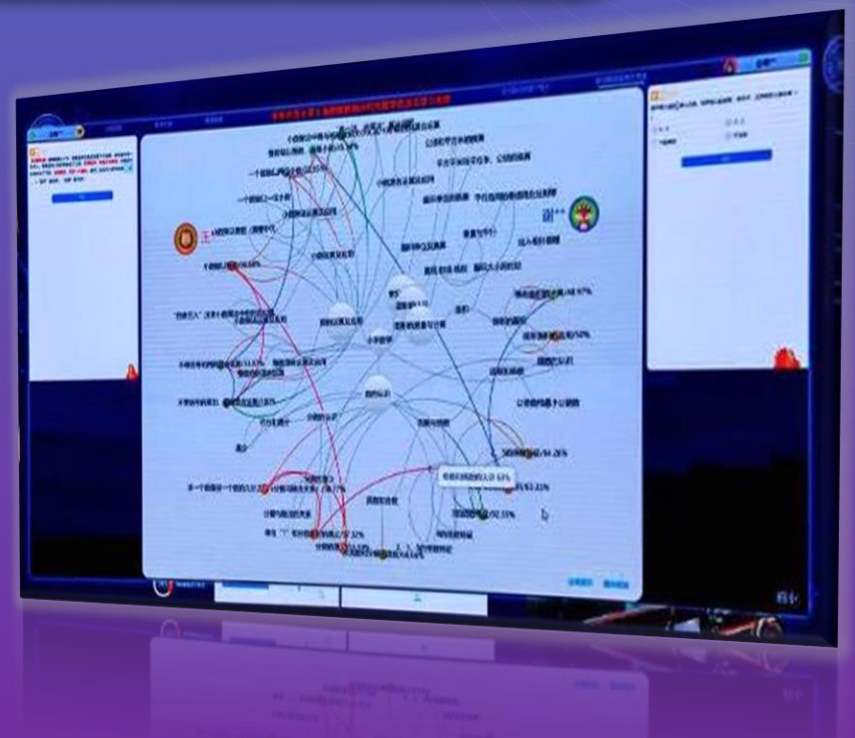
40万学生

2024

170万学生

3D Intelligent Adaptive Learning System of the Education Brain

On July 8, 2021, the 3D intelligent adaptive learning system jointly built by Takagi Learning and East China Normal University was released at the World Artificial Intelligence Conference.



It Already Started: An Example in Shanghai

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With the technology advancement, we are now having the responsibility and opportunity to cultivate our young generation to have the courage to discover, explain, dream and plunge repeatedly into new terrain of the universe so that the universe will somehow become clearer and even more inspiring. Such a universe is perhaps the real meaning of the metaverse.