PART 3

Seamless AI World

PART 3: Seamless AI World

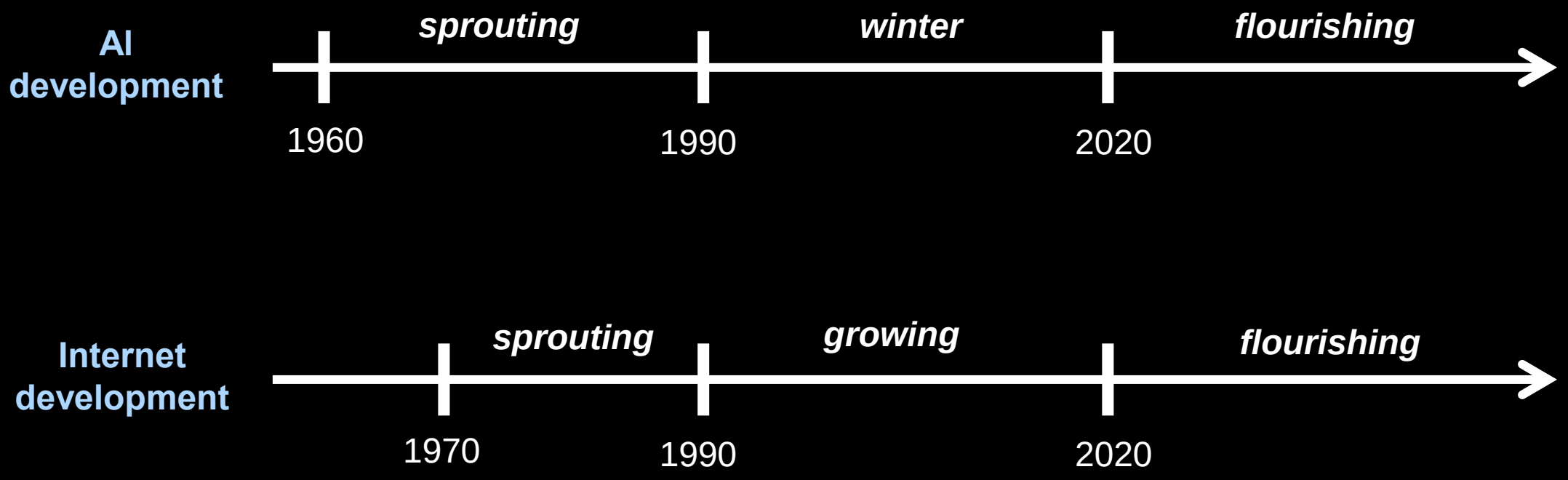
- We need to understand what the technology-infused world will be like in the future.
- AI supported education and artificial learning companions
- Seamless learning
- Seamlessly AI-empowered world

PART 3: Seamless AI World

- **We need to understand what the technology-infused world will be like in the future.**
- **AI supported education and artificial learning companions**
- **Seamless learning**
- **Seamlessly AI-empowered world**

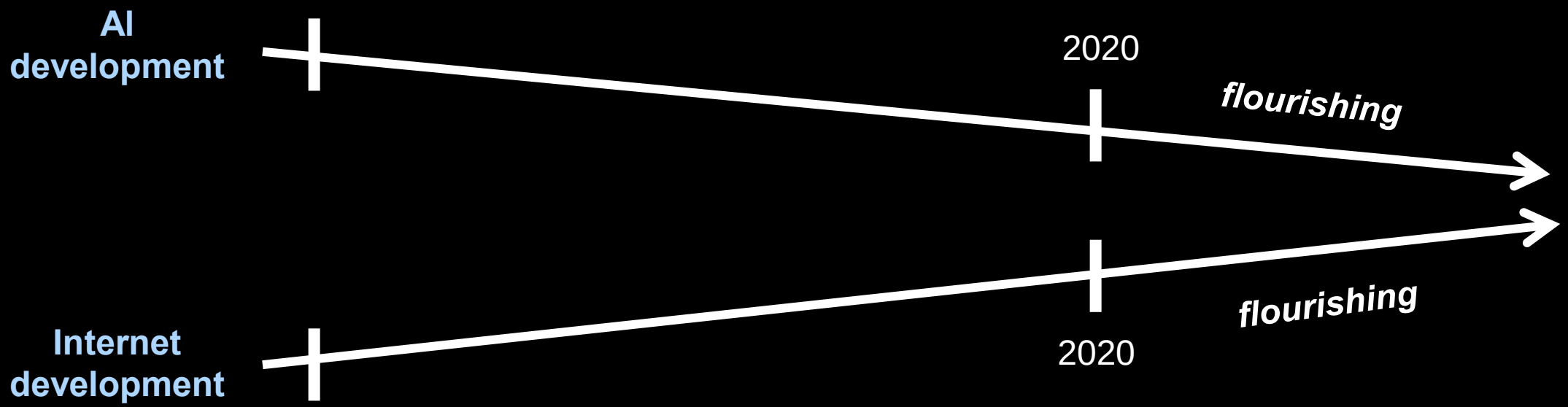
“All technologies are important for education only if they make our children more Harwell.”

AI & Internet: 3 development periods



Co-flourishing

Impact comes faster and bigger than we expect



robotics, the Internet of Things, quantum computing, broad chain, and others, the speed of the world's change due to technological infusion in the coming decade may be several times that of the last decade.

Due to the synergy of the Internet, AI, and other technologies, the speed of the world's change due to technological infusion in the coming decade may double that of the last decade.

However, ……

Schools are an exception.

Currently, schools are experiencing a slow pace of change due to ‘institutional inertia’ and other reasons.

This situation cannot persist indefinitely.

De-schooling?

We first ask a question:

Should schools exist?

(because years ago people talked about ‘de-schooling.’)

Covid-19 broke out in 2020. 10 years before that, I wrote in a paper (Chan 2010)

"Unless all parents one day work from home, unless the network communications bandwidth one day increases to the point where interface-to-interface interactions can supplant face-to-face interactions, schools will continue to exist."

"Even if these two 'unless' conditions become true, schools will continue; this is because with so many virtual worlds in which children engage or reside in the future, the school may be the most precious place for nurturing real-world, face-to-face socialization."

"Schools will not disappear but change. When and how schools will change, however, is not clear."

I’m not a prophet……

In 2010, I didn’t know COVID-19 would break out in 2020.

I didn’t know that schools would shut down, that students would have to learn online, and that parents would have to work from home.

But COVID-19 proves one thing: School must exist!

And the educational experience during the Covid-19 pandemic has heightened our concern about students’ wellbeing of learning.

The four problems

1. The *productivity* problem
   - the performance or output/input problem
2. The *school restructuring* problem
   - the problem how school is being transformed
3. The *lifelong, personalized curriculum* problem
   - the extension of the Holy Grail problem of ITSs
4. The *global educational goal* problem
   - rethinking the educational goal from the global perspective

Now, this leads to this problem……

To tackle this problem,

We need to understand what the world, infused with digital technology,

will be like and how it might evolve.

That is why we introduce the notion

‘Seamless AI World’.

PART 3: Seamless AI World

- We need to understand what the technology-infused world will be like in the future.
- **AI supported education and artificial learning companions**
- Seamless learning
- Seamlessly AI-empowered world

“The learning companion is almost there!”

I murmured to myself

when ChatGPT emerged.

What is a learning companion,

and why has everyone been suddenly talking about technologies like ChatGPT or Generative AI since 2022?

Because it is going to pass the Turing Test in various and subtle ways

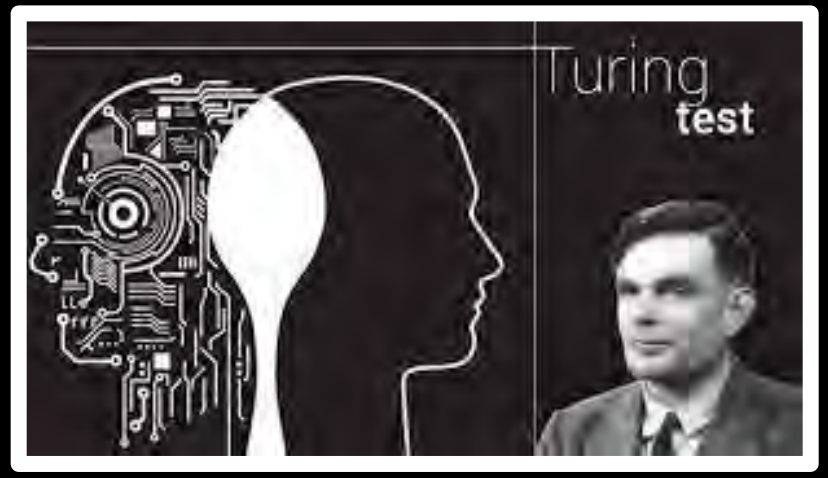
Digital Resemblance

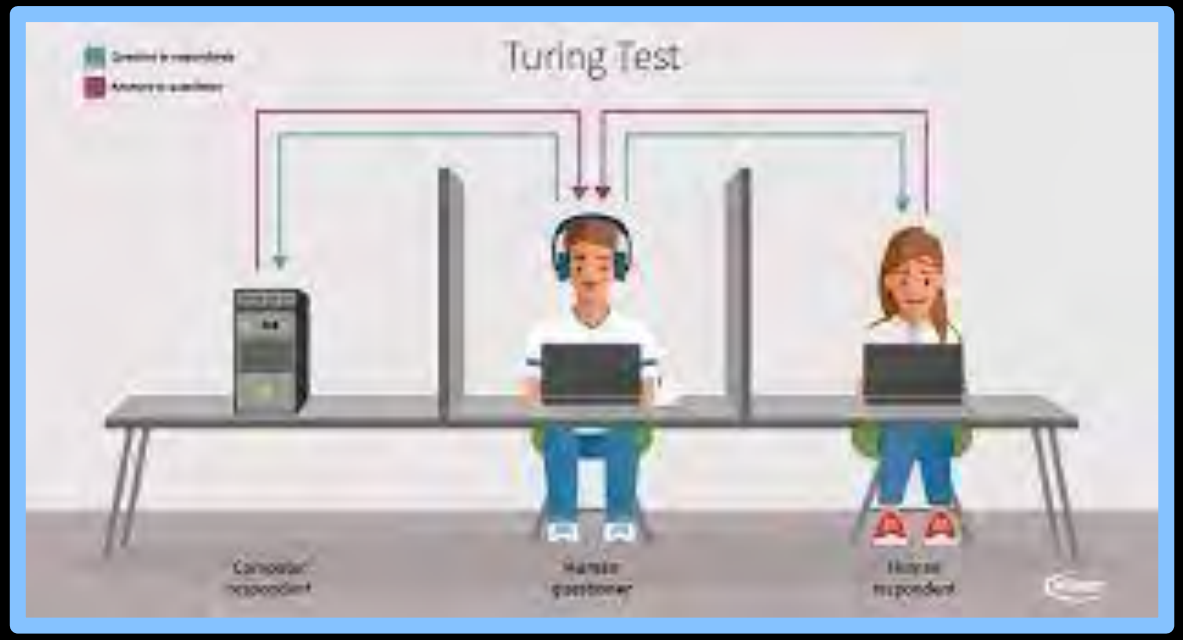
Intellectual
Emotion
Social Relationship
Value System
……

We cannot distinguish the AI companion we are interacting is a real human or artificial human (virtual or robotic)

Because the Rise of AI Companions (con’t)

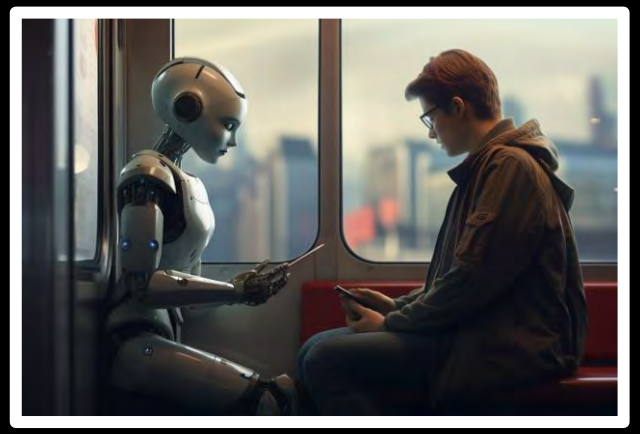
Turning Test (1950)



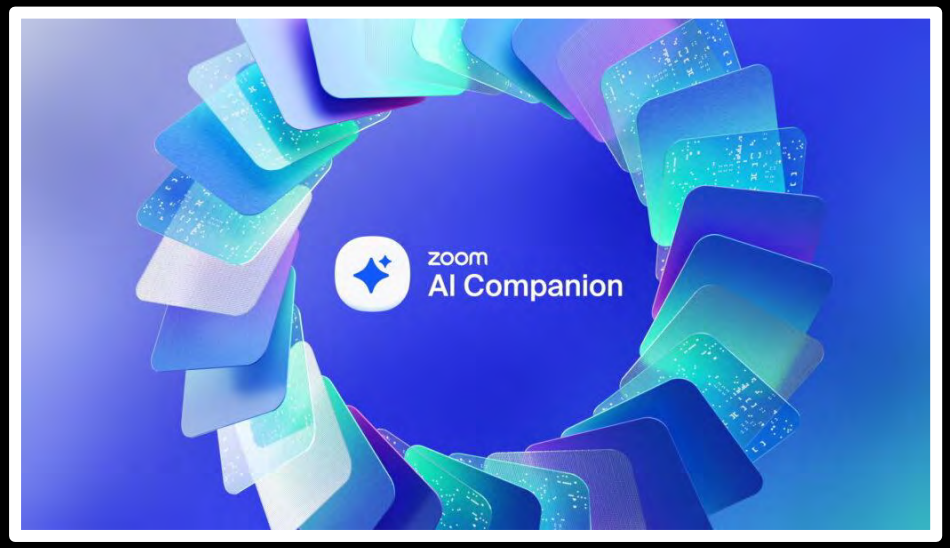


Ping Pong Robot

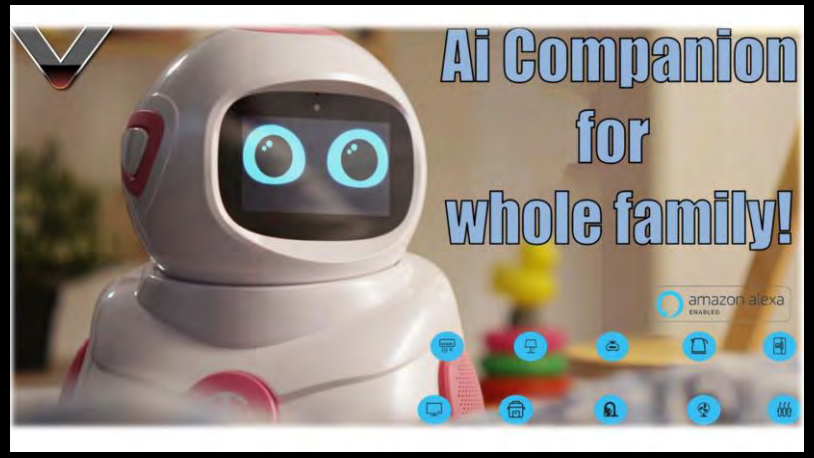
Because the Rise of AI Companions (con't)



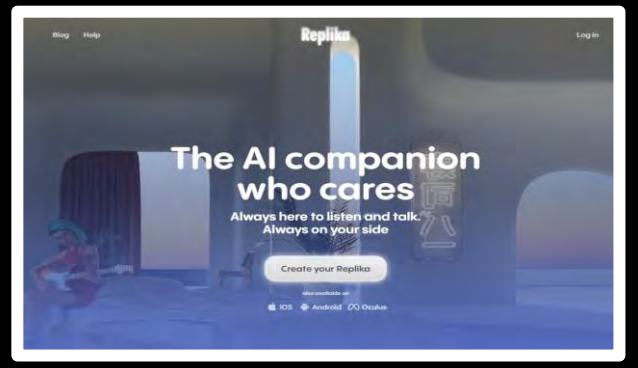
https://replika.com/



https://www.pcguide.com/ai/zoom-ai-companion/

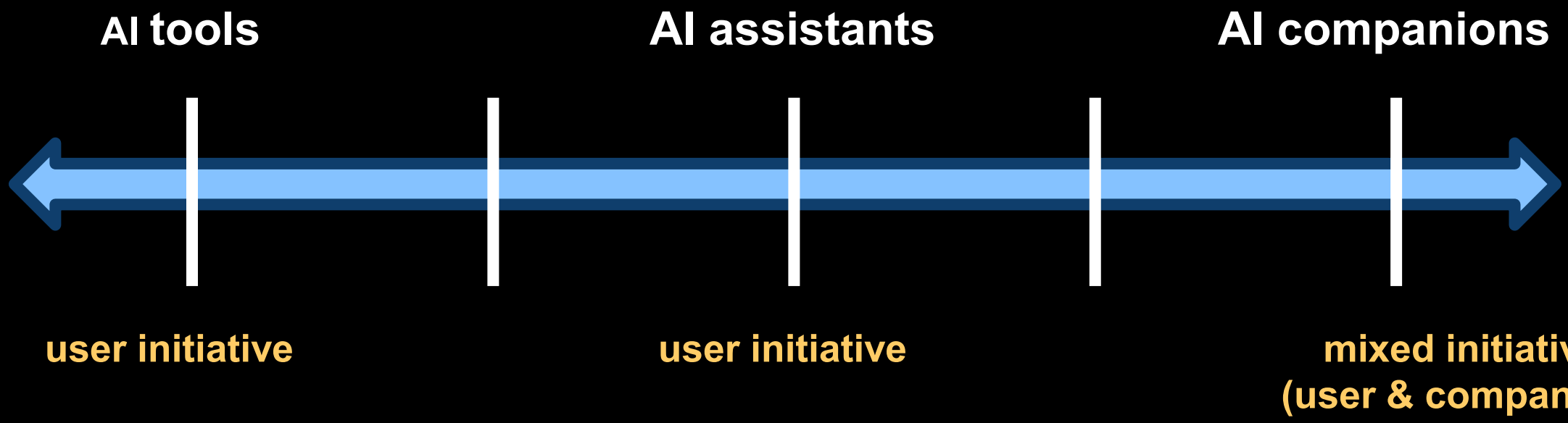


https://anyflip.com/ekqm/gsfg



https://neurosciencenews.com/ai-robot-loneliness-23616/

A spectrum of
‘AI as a tool’ to ‘AI as an artificial human companion’



How does AI empower learning?

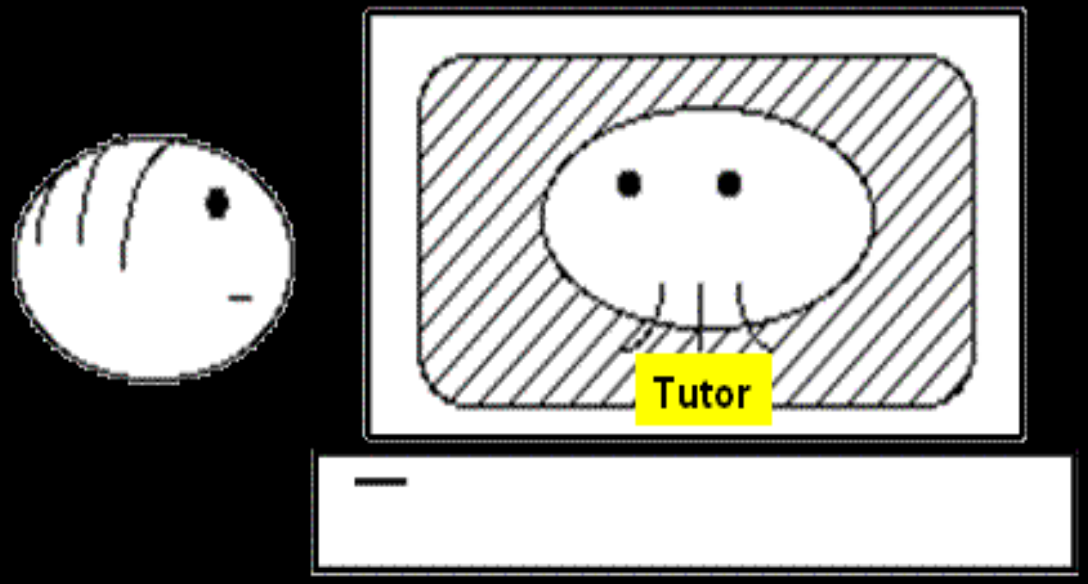
“The further backward you look,
the further forward you can see.”

Winston Churchill

Turing Test for education?

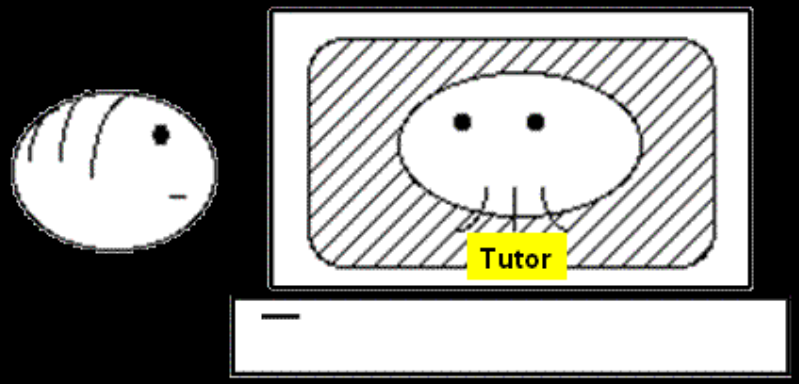
- Resembling human tutor?
- Intelligent Tutoring Systems (ITSs)
- SCHOLAR: The FIRST ITS
  - Developed by Jaime R. Carbonell in 1970
- SCHOLAR: The FIRST Chatbot for education
- AI in CAI: An artificial-intelligence approach to computer-assisted instruction”
  - ICAI

Turing Test in education domain



Intelligent Tutoring System (ITS)
(Carbonell, 1970)

WHY intelligent tutoring systems?



Bloom's 2-sigma performance problem

SCHOLAR (1970)
The first chatbot for education

Student initiated interactions

```
*HOW MANY SQUARE MILES ARE THERE IN BRAZIL?*

   THE AREA IS APPROX 3600000. SQUARE MILES.

*WHAT IS THE PRINCIPAL RELIGION IN URUGUAY?*

   THE PRINCIPAL RELIGION IN URUGUAY IS CATHOLICISM.

*
 WELL, HAVE YOU MADE UP YOUR MIND?

*THE PRINCIPAL RELIGION IN PERU IS ---.*

 I'M AFRAID I CAN'T ANSWER THAT.

*IS IT TRUE THAT THE AREA OF URUGUAY IS 70000?*
 THAT'S ABOUT RIGHT. THE EXACT ANSWER IS 79000.


*COULD YOU PLEASE INDICATE THE PRINCIPAL RIVERS IN
 ARGENTINA?*

 I DON'T UNDERSTAND YOUR WORD "INDICATE". I'LL GIVE
       YOU ANOTHER CHANCE.

*THE PRINCIPAL RIVERS IN ARGENTINA ARE ---.*

   THE PRINCIPAL RIVERS IN ARGENTINA ARE THE RIO DE LA PLATA,
       THE PARANA, THE URUGUAY RIVER, THE SALADO, THE
       PARAGUAY RIVER, AND THE PILCOMAYO.
```

Mixed initiative interactions

```
*MIXINIT*

 DO YOU WANT TO CHANGE THE GENERAL MODE OF THE INTERACTION
      TO MIXINIT?
 PLEASE ANSWER Y OR N.

*Y**

 OK, MR. JONES. LET'S GO AHEAD.

 WHERE IS BRAZIL?


 PLEASE HURRY UP. I'M WAITING FOR YOUR STATEMENT.

*IN SOUTHAMERICA*

 I BELIEVE YOU MEANT TO TYPE "SOUTH AMERICA".

 THAT'S RIGHT.
```

Socratic Dialogue

Knowledge Representation of the domain knowledge in Scholar

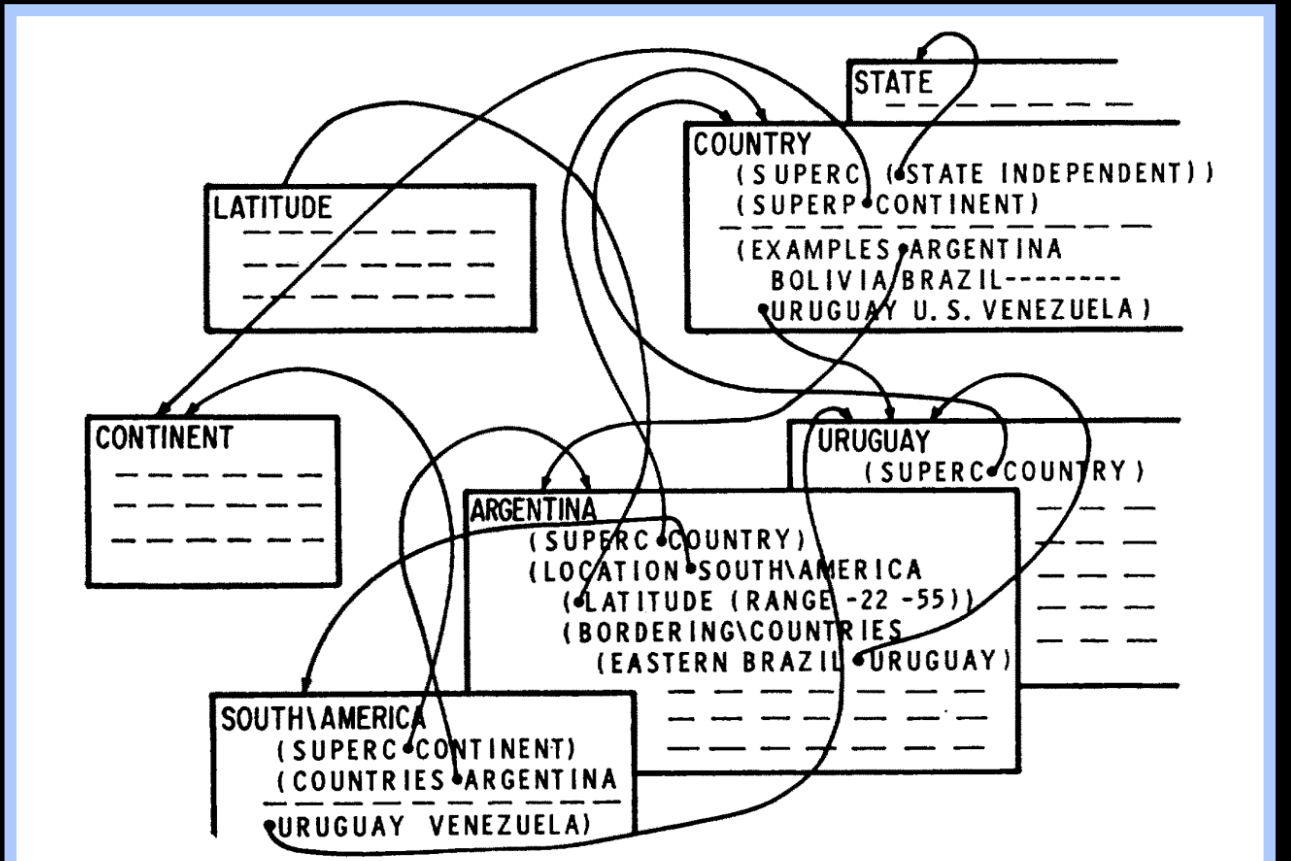
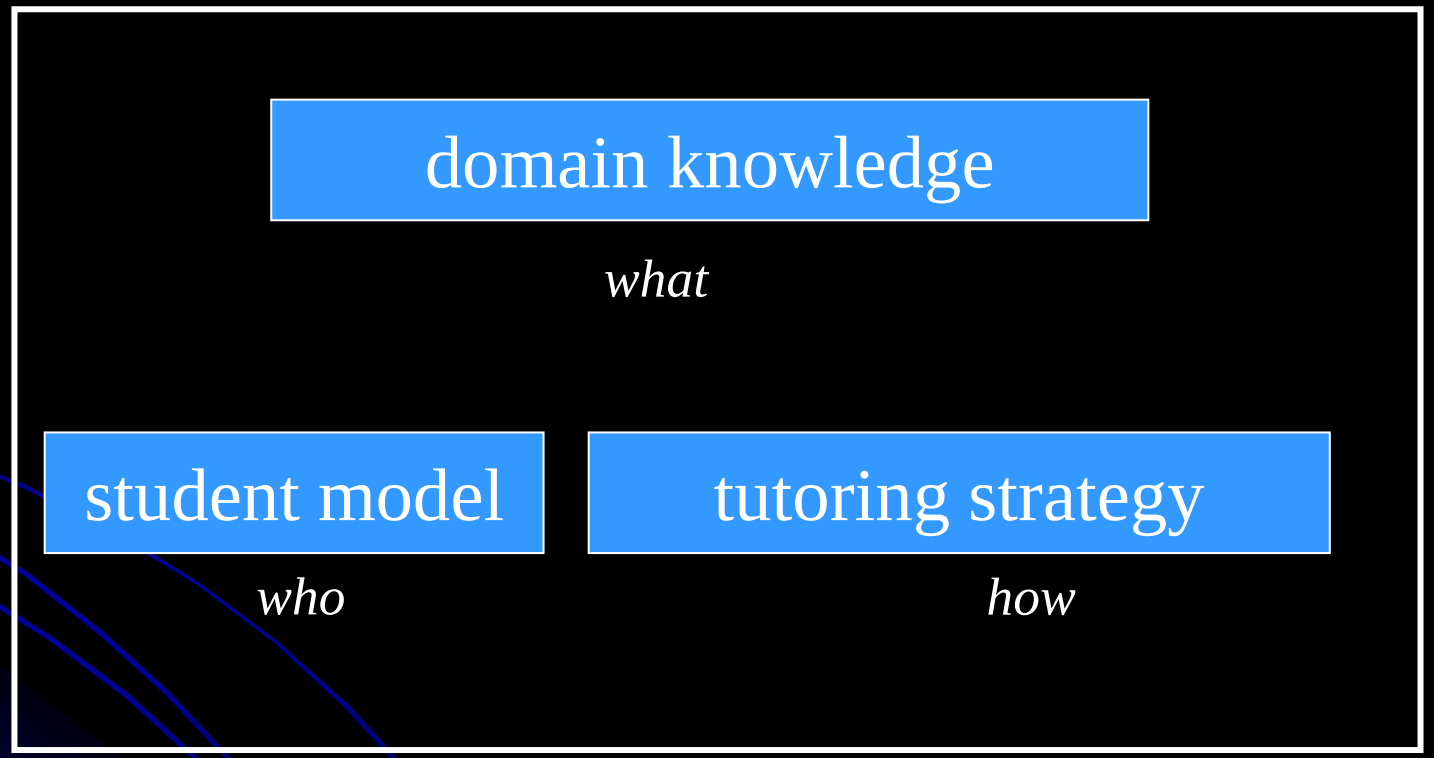


Fig. 2. Representation of a portion of a network on South America.

Classical intelligent tutoring systems (ITSs) (Self, 1974)



The earliest chatbot?

Joseph Weizenbaum (1966)

Eliza

An early natural language processing computer program at MIT

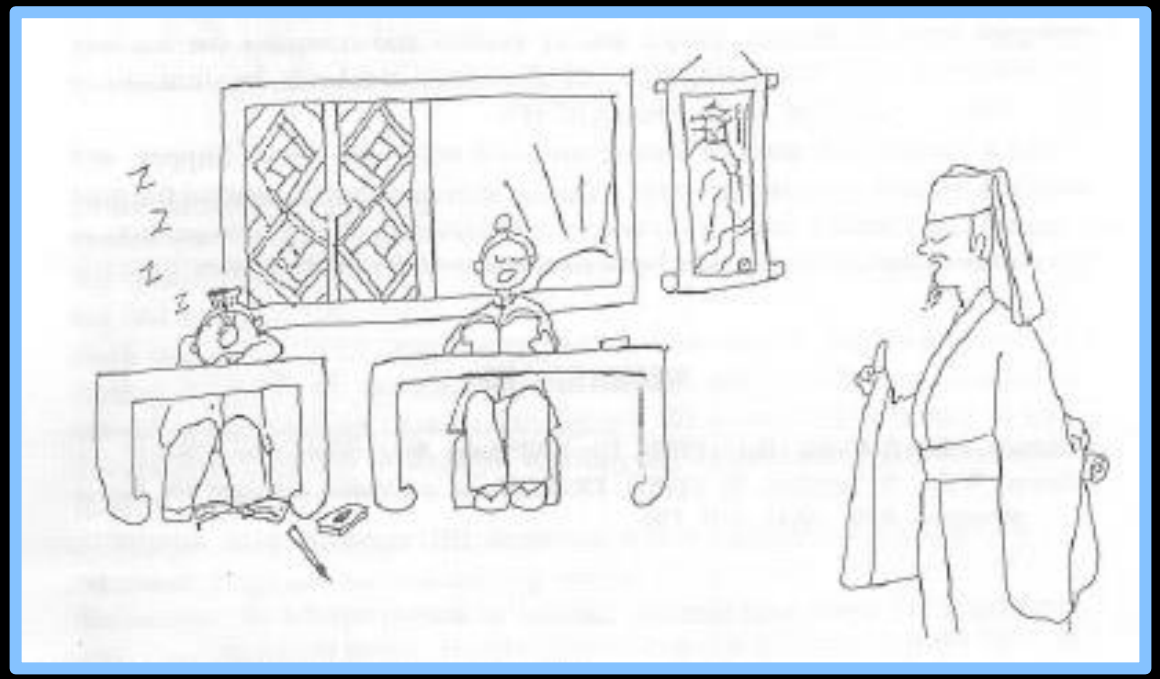
```
Welcome to
                EEEEEE  LL      IIII   ZZZZZZ   AAAAA
                EE      LL       II       ZZ   AA   AA
                EEEEE   LL       II     ZZZ    AAAAAAA
                EE      LL       II    ZZ      AA   AA
                EEEEEE  LLLLLL  IIII ZZZZZZ    AA   AA

  Eliza is a mock Rogerian psychotherapist.
  The original program was described by Joseph Weizenbaum in 1966.
  This implementation by Norbert Landsteiner 2005.


ELIZA: Is something troubling you ?
YOU:   Men are all alike.
ELIZA: What is the connection, do you suppose ?
YOU:   They're always bugging us about something or other.
ELIZA: Can you think of a specific example ?
YOU:   Well, my boyfriend made me come here.
ELIZA: Is it important to you that your boyfriend made you come here ?
YOU:   He says I'm depressed much of the time.
ELIZA: I am sorry to hear that you are depressed.
YOU:   It's true. I am unhappy.
ELIZA: Can you explain what made you unhappy ?
YOU:
```

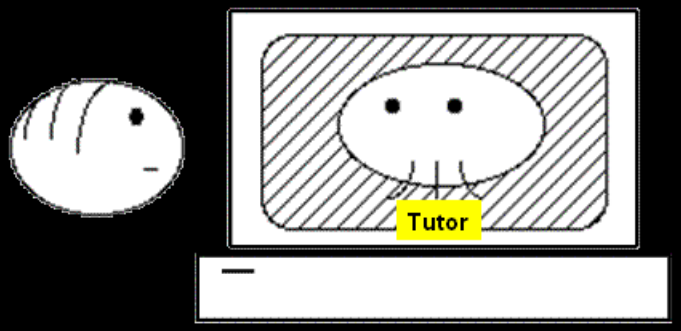
https://www.appypie.com/blog/what-is-a-chatbot

The origin of
Artificial Learning Companions (ALCs)

Learning with the Prince

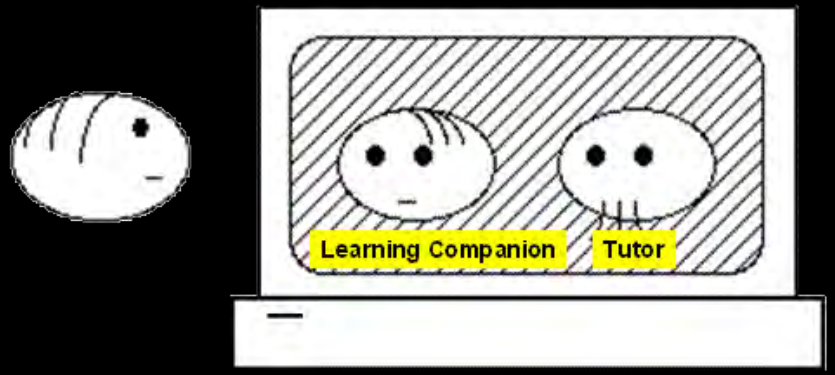
- It is assumed that the prince will learn better when he studies with his classmate (in a social context)
- Supported by zone of proximal development (ZPD)



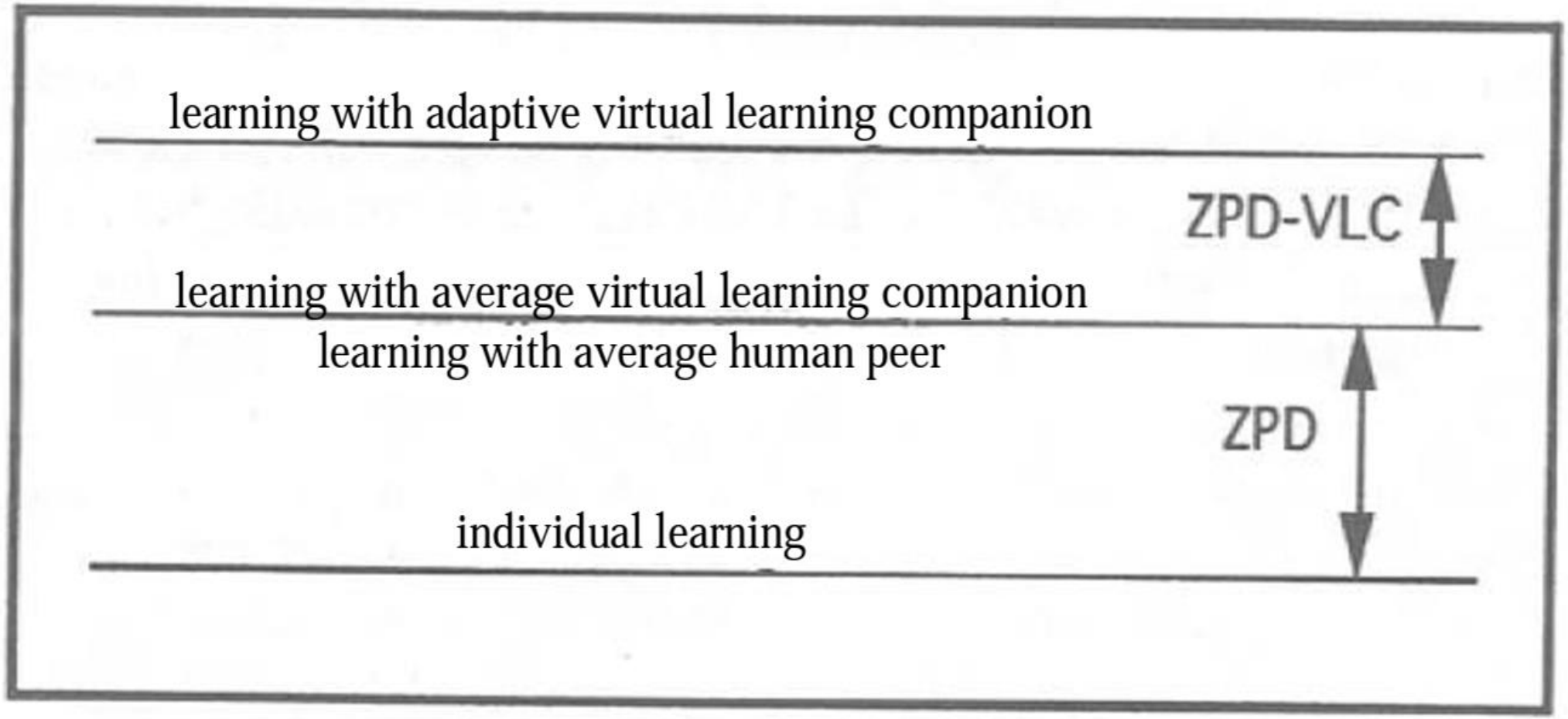


Intelligent Tutoring System (ITS)
(Carbonell, 1970)

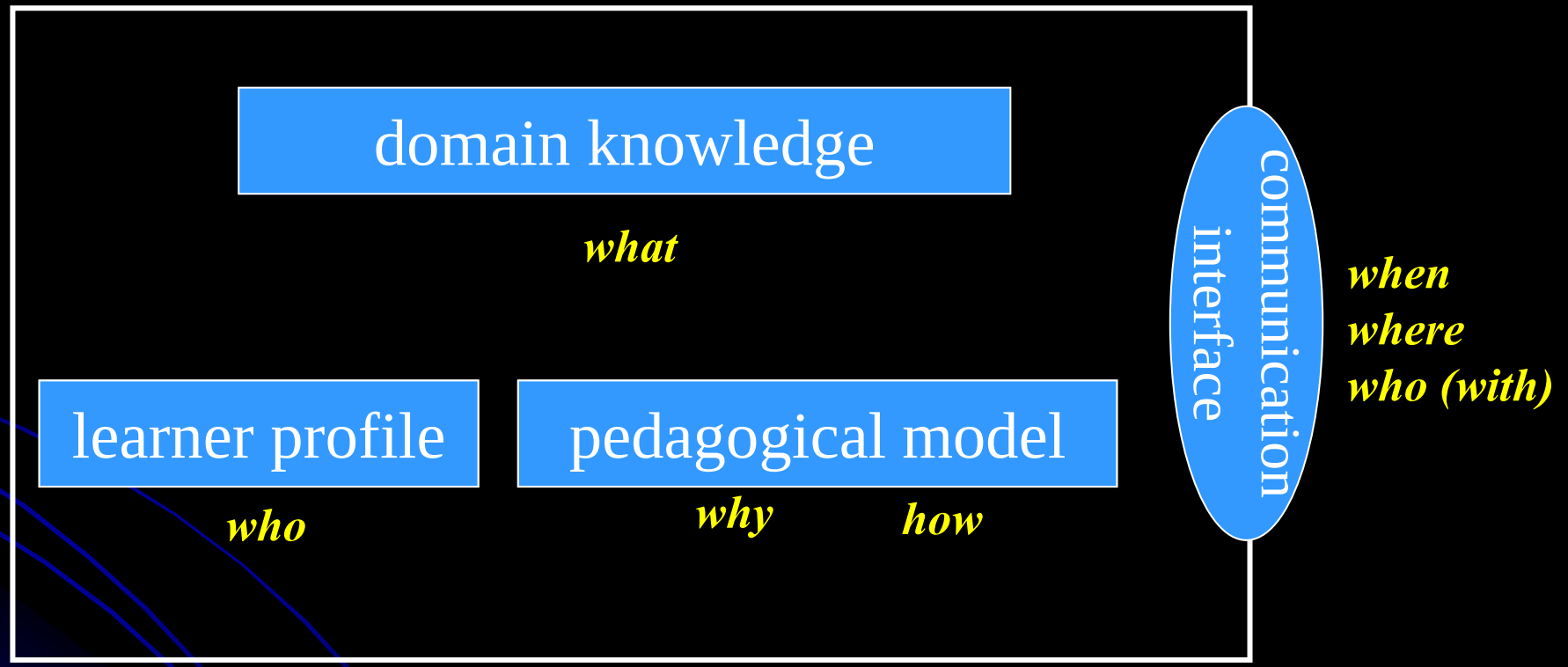
Vygotsky's socio-cultural theory



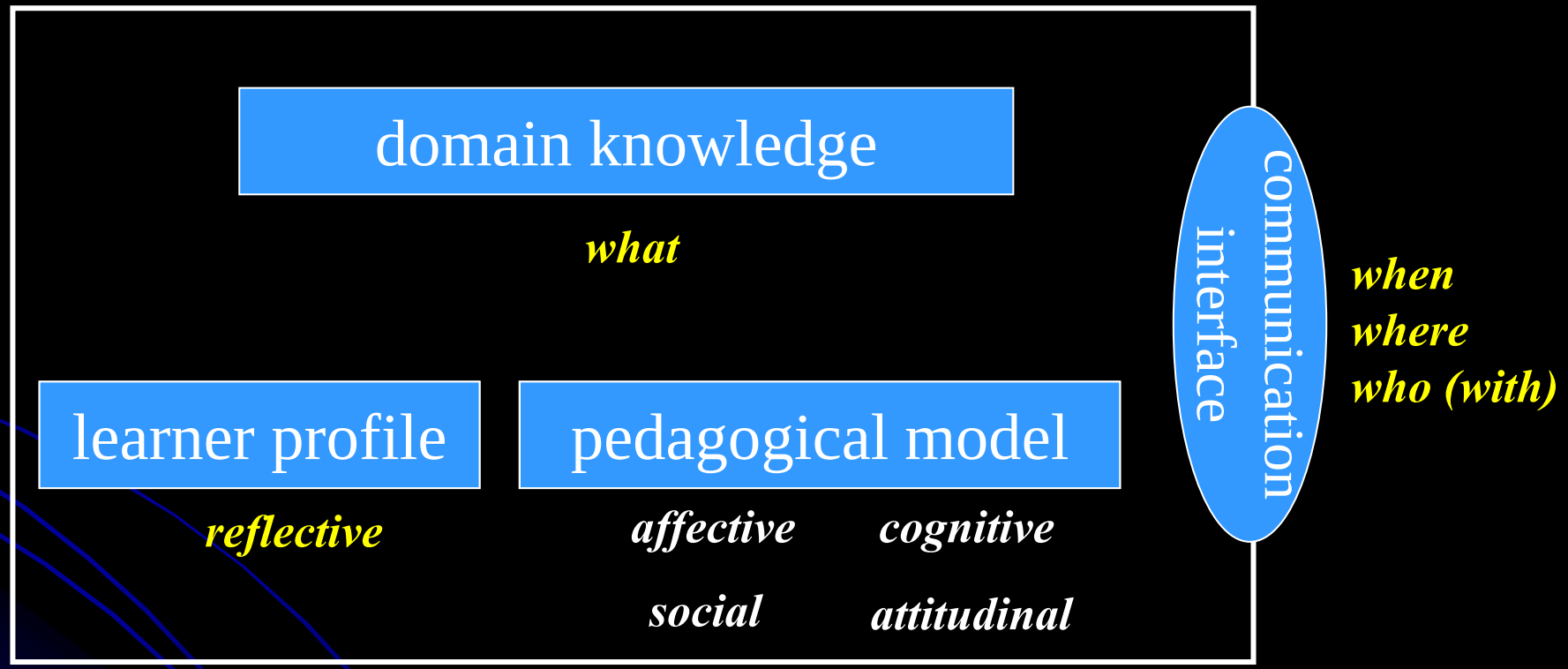
Learning Companion System
(Chan & Baskin, 1988)



Zone of proximal development with respect to VLC (Chan, 1995)


domain knowledge
what
learner profile
who
pedagogical model
why
how
communication interface
when
where
who (with)

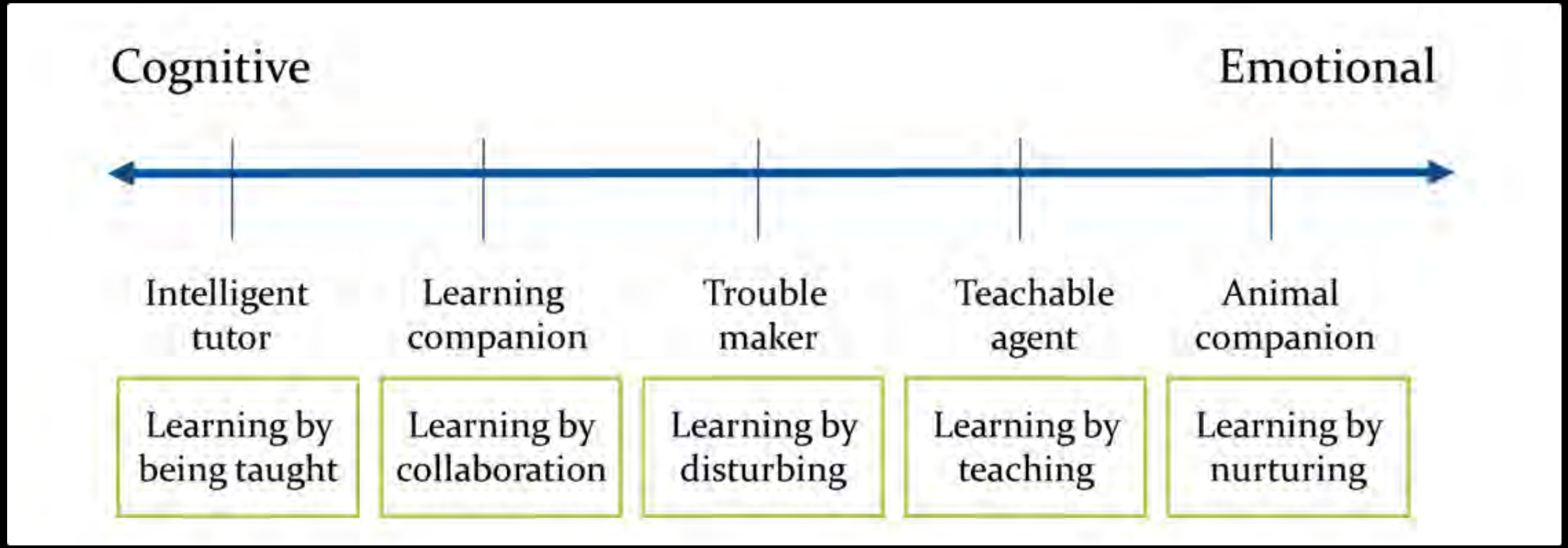
Learning beyond knowledge acquisition



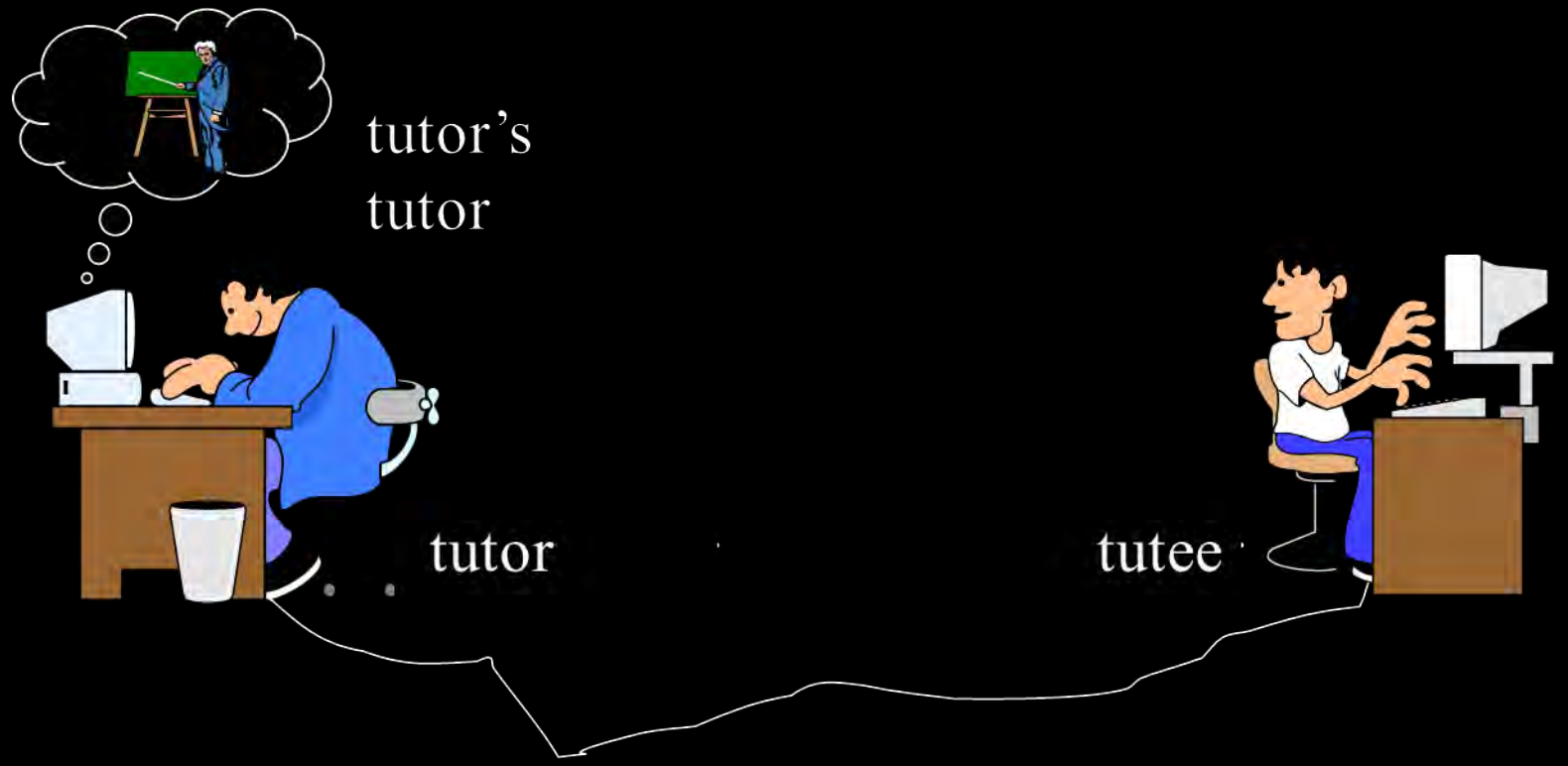
Expected outcomes of ALCs

1. Cognitive
2. Meta-Cognitive
3. Affective
4. Behavioral
5. Social
6. Well-being?

Spectrum of ALC roles & strategies (Chou, et al., 2024)



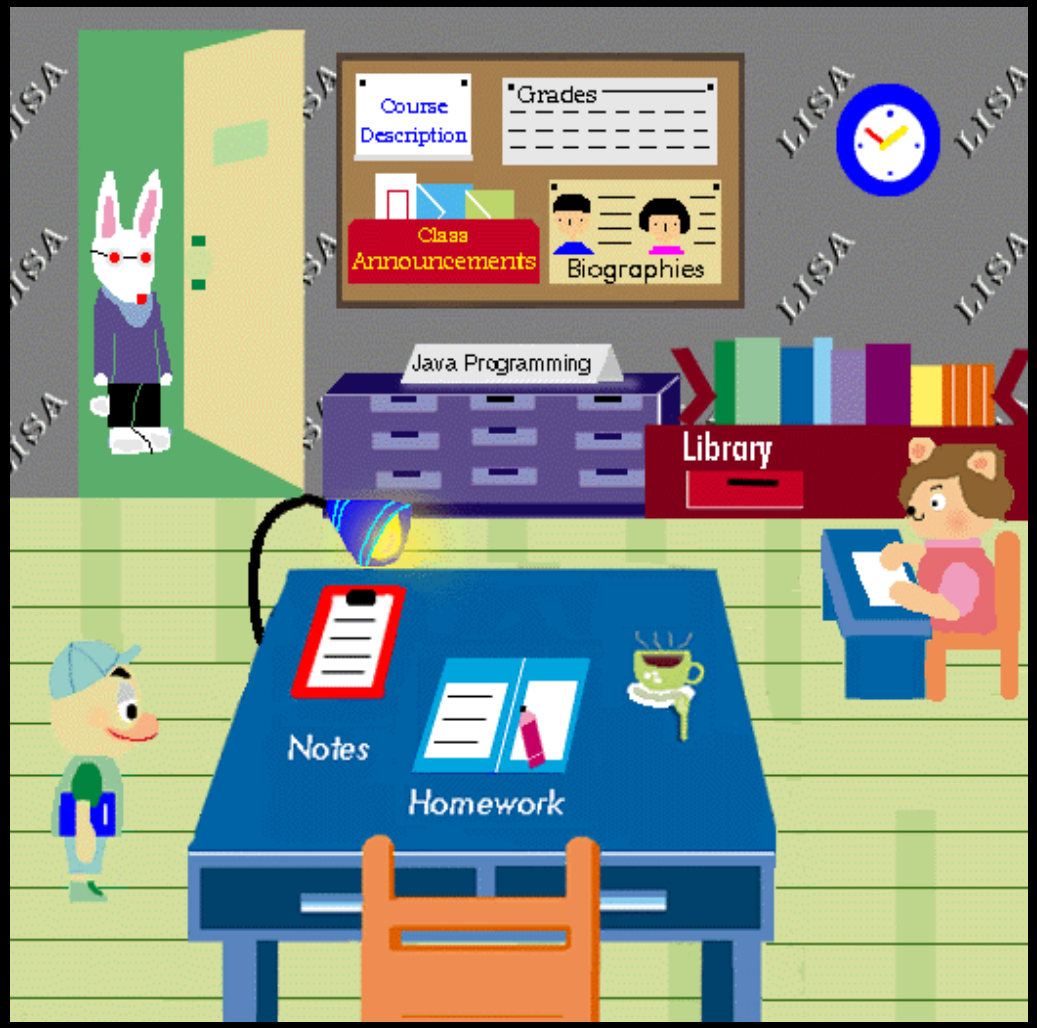
ALC in networked learning
(1989…)



(Chan, GCCCE1997)

teacher's secretary

learning companion



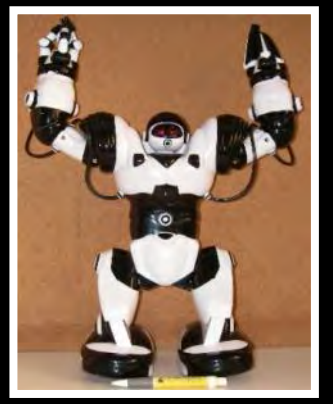
student's secretary

My animal companions

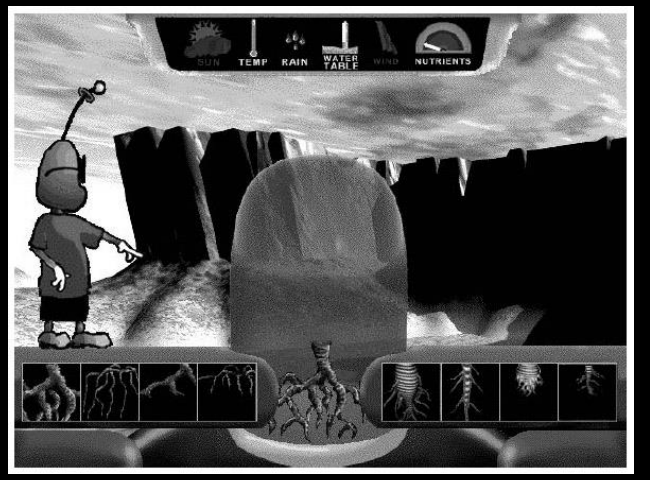
Disneyficating the learner

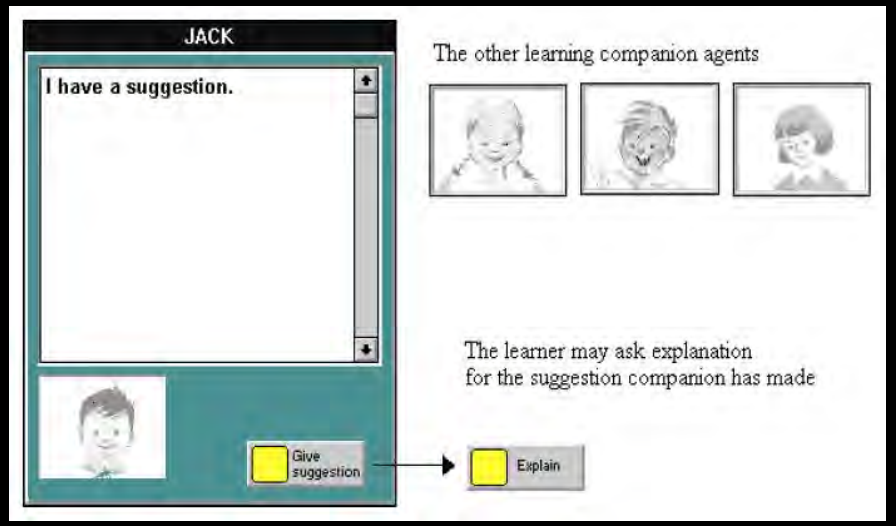
Artificial Learning Companion (robotic)

(Shu, et al, 2007)

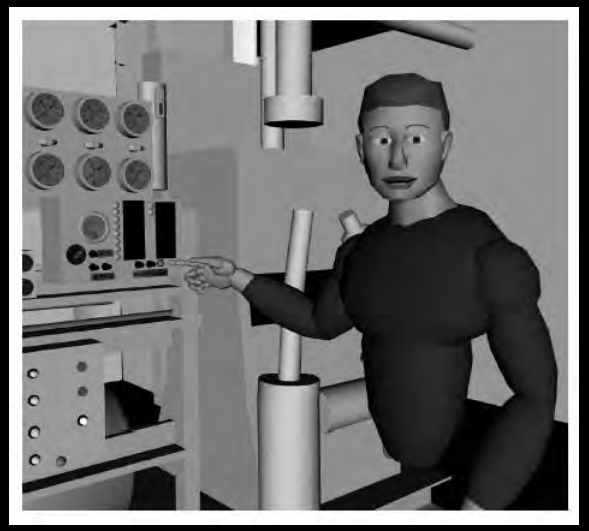


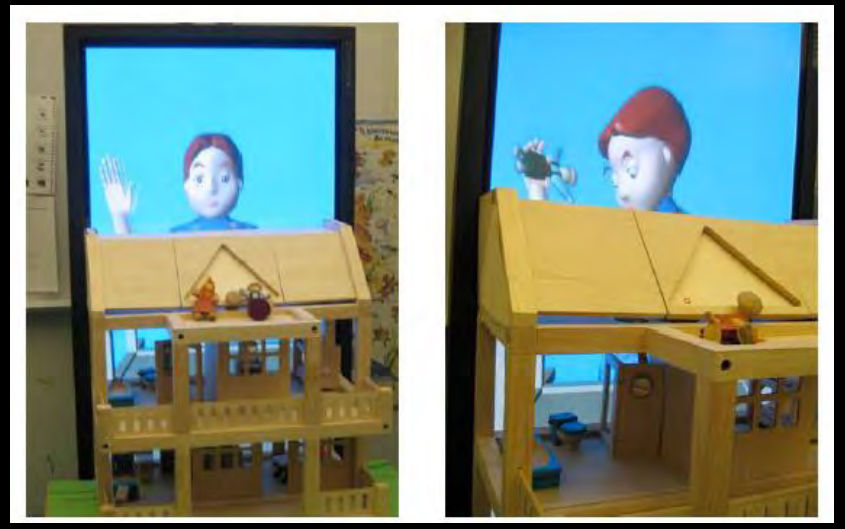
Artificial Learning Companions (virtual)

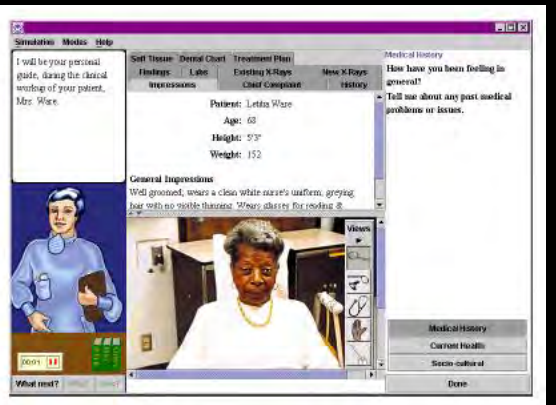




Artificial Learning Companions (virtual)

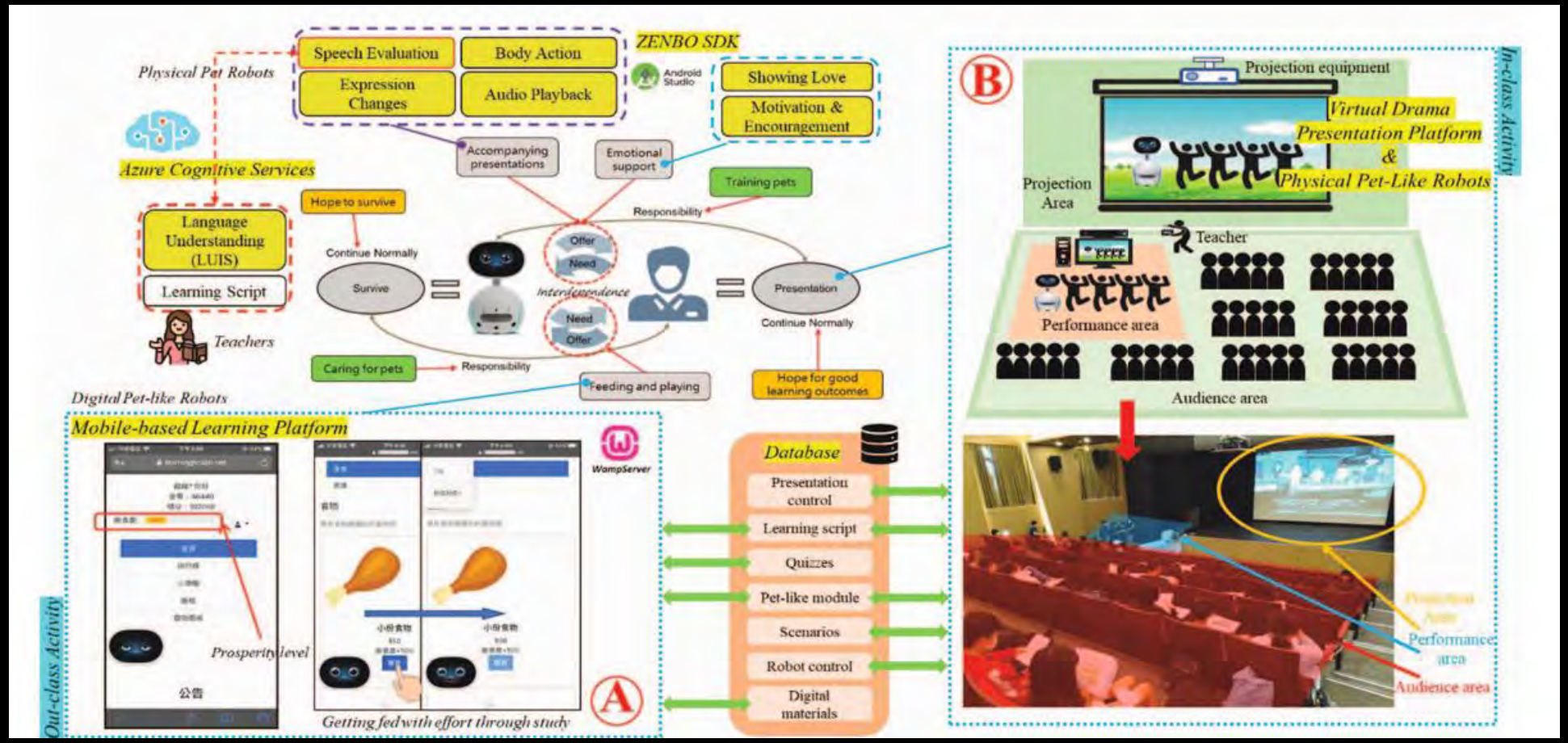






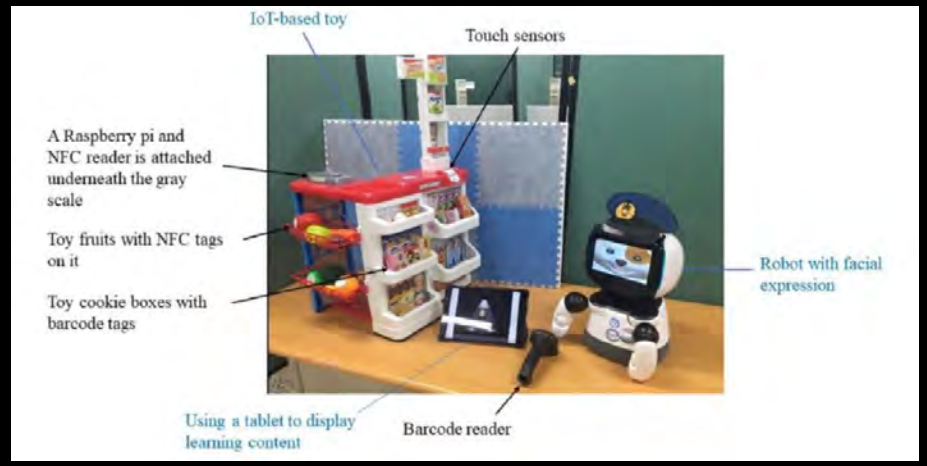
Artificial Learning Companions (robotic)

(G. D. Chen & colleagues, 2006, 2010, 2022)



Artificial Learning Companions (robotic)

(Cheng, Wang, Yang, Yang, & Chen, 2021)



Modifications made in the design of IoT-based toys across different versions	V1	V2	V3
Related to daily life experience	✓	✓	✓
Thematic learning content	✓	✓	✓
A shopping scenario		✓	✓
Using Tangible objects			✓
Multiple IoT sensors			✓

Figure 6. Modifications made in the design of IoT-based toys across different versions.

Lifelong AI learning companion

(Chan, 2000; Chan, et. al., 2001; Chou & Chan, 2003)

baby: learning companion as a magic cradle 

small kid: learning companion as a toy 

pupil: learning companion as a pet 

teenager: learning companion as a peer 

adult: learning companion as a mentor 

elder: learning companion as a pet 

The four problems

(Switch the order, considering its pressing need)

1. The *global educational goal* problem
   - rethinking the educational goal from the global perspective
2. The *productivity* problem
   - the performance or output/input problem
3. The *school restructuring* problem
   - the problem how school is being transformed
4. *The lifelong, personalized curriculum problem*
   - the extension of the ITS's Holy Grail problem

Lifelong artificial learning companions partially respond to this probem

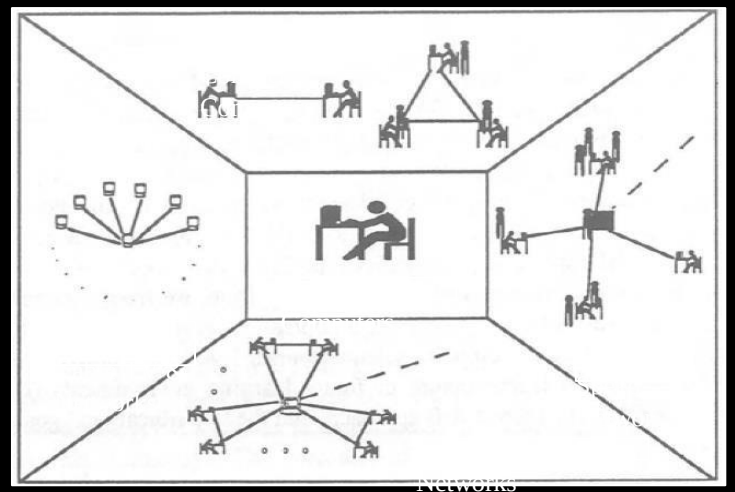
PART 3: Seamless AI World

- We need to understand what the technology-infused world will be like in the future
- AI supported education and artificial learning companions
- **Seamless learning**
- Seamlessly AI-empowered world

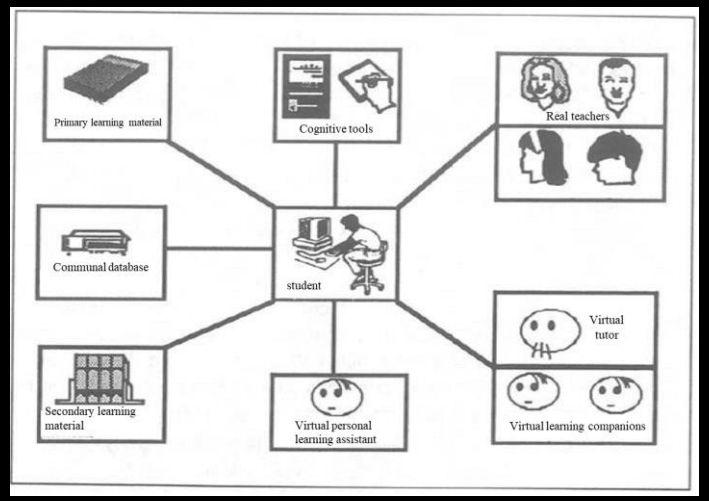
Back to the keynote at AIED'95

"Learning Companion Systems, Social Learning Systems, and the Global Social Learning Club" (Chan, 1996)

Social Learning System

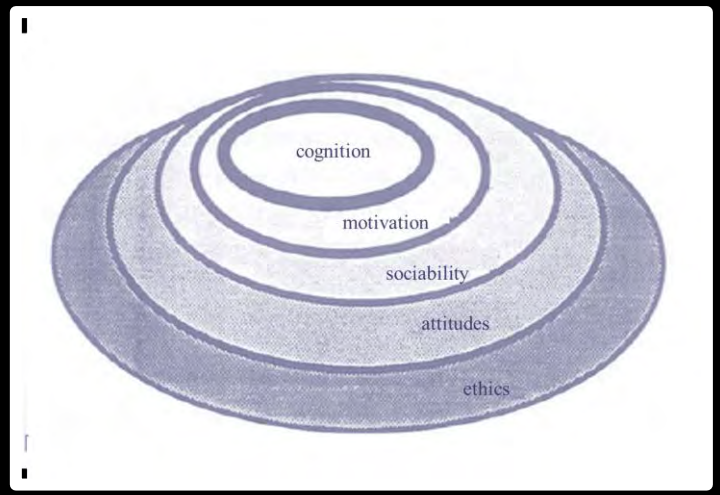


Networked Social Learning Environment



Learning Beyond Cognition

Five Educational Goals



cognition, motivation, sociability, attitude, ethics

Stimulated by our networked learning research that began in the late 80's, I had a dream about

'Global Social Learning Club'

(As a Program Co-Chair,
I established the theme of the ICCE1998 in Beijing as 'Future of Global Education')

In 2000, we built a large online learning community, EduCity, possibly the largest one early in this century (1.5 millions users in 2004)

亞卓市開埠 網路公民進駐

中央、清大、陽明及花師合作開辦虛擬城市 訓練參與者成為優質公民

四校攜手建構 胡慧平／報導

對有意實踐終身學習，成為網路公民的現代人來說，網際網路無疑是最佳學習園地，更是教育工作者一展活力，與大眾分享資源的絕佳選擇。由中央、清大、陽明及花蓮師範學院四所大學合作開辦的網路虛擬城市「亞卓市」，在創市近一個月時間，已湧入超過四千人進駐，扮演網路公民角色。

也許外界初聽到「亞卓市」，可能以為只是某個瀏覽網路的名稱，或是房地產推案網站，其實，亞卓市是「亞洲卓越城市」的簡稱，它雖然只是個學校教育網站，但提供的服務不比時下流行的社群網站遜色，使用者不但可以申請免費帳號，還包括WEB MAIL、BBS網路論壇、檔案下載、言論廣場、教育精選網站及一般精選網站、研究園區、教學網頁等，希望邀請中小學生擔任市民，學習各種知識，甚至可扮演政府官員等各種角色，達到運用網路科技的目的。

談起「亞卓市」的來由，中大校長劉兆漢說，網路是新時代極重要的科技，也是知識取得的來源之一，但若網路中沒有好的內容，上網就沒有什麼意義。因此當在一次會議上，該校劉德恩教授提出在網路上建構一個虛擬城市的想法，希望提供多方面資源，讓民眾，特別是中小學學生學習做個「網路公民」，他便邀請清大、陽明及花師加入，將這個網路虛擬城市命名為「亞卓市」，也就是「亞洲卓越城市」之意。

懷抱著讓學生們都能成為優秀的網路公民理念，校長們還特別情商致力推展教育改革的中研院院長李遠哲，擔任亞卓市的榮譽市長，除替亞卓市的發展提供意見，還希望透過亞卓市和網路無遠弗屆的特性，讓教育改革理念，能由上而下深植到參與者心中。

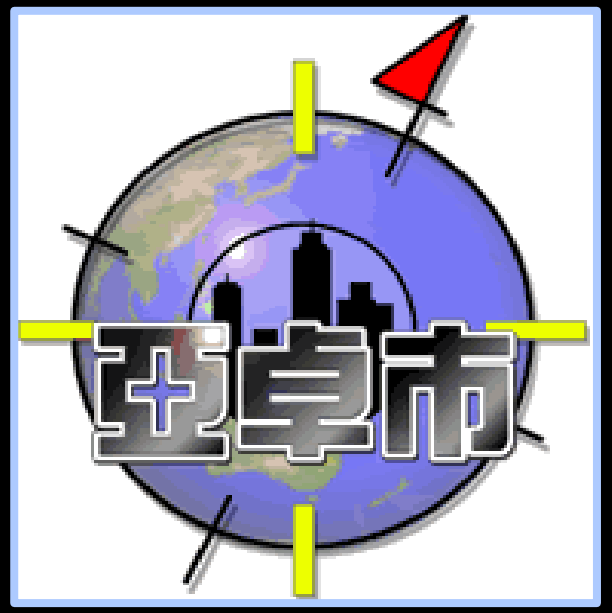
亞卓市網站在七月中旬開張後，目前已經有超過四千名的網路使用者進駐該城市。在亞卓市中，註冊的網路市民不但可以享受一般社群網路提供的服務，網站中會提供機會讓市民扮演各種角色，如法官、學生、老師、市議員等，體驗，了解社會各角色的工作與責任。

除提供社群網站的各項服務外，亞卓市還有個相當特殊的地方，就是與清大的網路博物館「消厭園」合作，提供各項科學、文藝資訊，讓亞卓市的參與，能成為兼具知性與感性的網路公民。亞卓市網址：www.educities.com.tw。

▲亞卓市期望每位參與者，都能成為優質的網路公民。

影像合成／禮珍

2000



中國時報 | 資訊周報 | 資訊交流道 — 中華民國八十九年一月二十五日／星期二 44

亞卓市：虛擬社群網站 人人終生學習

網路教育高峰會 勾勒未來發展遠景 提供多元環境 更多互動關係 產生集體智慧

記錄／李宗祐、胡慧平 攝影／鄭南光

資訊網路時代來臨

（第一輪討論）

▲李遠哲（中研院院長）　▲吳清基（教育部次長）　▲劉兆漢（中央大學校長）　▲劉炯朗（清華大學校長）　▲曾志朗（陽明大學校長）　▲陳伯璋（花蓮師範學院院長）　▲李學松（中國時報社長）

中國時報 — 中華民國八十九年十二月六日 星期三

真實與虛擬 結成好姐妹

北市與虛擬城市亞卓市簽約 敲定八項合作計畫

台北市長馬英九（右）昨透過視訊會場，與在另一現場代表亞卓市的教育部長曾志朗（左）簽約，雙方結為姐妹市。（記者蔡中隆攝）

2000

亞卓市網路教師 最年輕15歲

虛擬學校開課比賽頒獎 十五名獲獎教師多是學生 康康才國三 學生百餘人都比他大

年十三歲的呂康豪在亞卓市卓亞全民開放學校開課比賽中，獲得組年少青列系用應技科訊資礎基課開民全在。
影攝／松若李者記

【記者李若松／台北報導】距離教師節還有半個月，虛擬學校「亞卓市」舉辦的「全民開課」比賽，昨天頒獎給優秀的網路教師。最年輕的開課老師呂康豪僅十三歲，目前還就讀師大附中國中部三年級，他教授「程式設計與應用」，學生多達一百多人，全都比他年長。

虛擬學校「亞卓市」（www.EduCities.edu.tw）今年元月開張以來，市民迄今已達廿七萬人；「亞卓市」三月底舉辦開課比賽，師生總人數已超過一萬七千人，課程約五百多門，其中有兩百四十三門參加開課比賽。

「亞卓市」計畫主持人、中央大學資訊工程所教授陳德懷表示，在網路上舉辦全民開課比賽，在台灣，甚至是全世界都是創舉。這次開課比賽主要以基礎資訊科技的應用為主，包括電腦入門、網際網路應用、網頁製作等，根據開課老師的年齡，細分為青少年組與成人組，上課的學生則沒有年齡的限制，為了讓其他優秀課程也能參賽，還增設「不限定科目創新教學課程」組，使開課內容更多元。

全民開課比賽評審、清華大學教授楊淑卿表示，與賽者的年齡從國中生到五十歲以上的人都有，職業則包括學生、地檢署觀護人、醫院心理師等，最後得獎的十五位開課老師，多數仍在學，白天是學生，晚上搖身一變成網路名師，他們在網路上應用心理測驗，有獎徵答等許多不同於傳統教室教學法，吸引學生追隨他們學習。

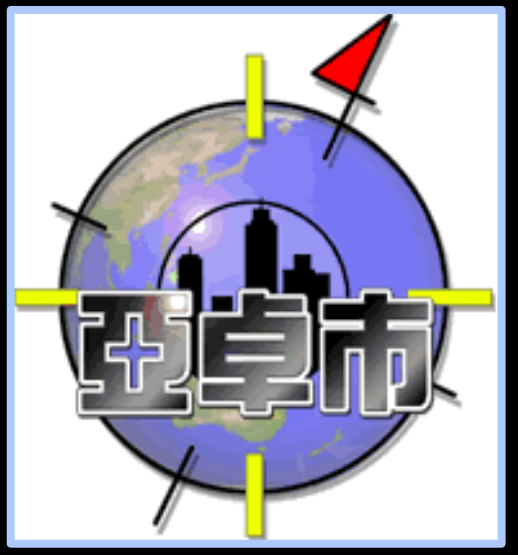
呂康豪在網路上暱稱「康康」，年僅十三歲，卻是「亞卓市全民學校」最年輕的電腦老師，學生的年齡都比他大。這次比賽他獲選為青少年電腦組的甲等獎。康康受到就讀資訊系的家教老師影響，對電腦興趣濃厚，國小時就當選兒童資訊小楷模，長大想做程式設計師。

康康說，他會到亞卓市開課，主要是因為有一次他參加科展，評審老師認為以他的年齡不可能做出那麼好的作品，認定他作假，因而落選。康康不服氣，因此在全民學校開設電腦 VB（Visual Basic）課程，成為在網路上教授程式設計與應用的名師。呂康豪說，現實生活中他要念書、還要在網路上當老師，很辛苦；躲路上一百多位學生的年紀都比他大，大家都在網路上互動，沒有人因為他是小孩子而不向他請教。

在網路世界裡，像康康這樣「學生兼老師」的不少。淡江大學的「皮皮」－龔紫蓉從小就想當老師，亞卓市虛擬學校讓她圓夢，除了每周三次上網講授「輕輕鬆鬆學會電子商務」課程，有時還要幫學生補課；為了做好老師，還必須自我充電，多讀電子商務、行銷、管理的書籍，經常忙到半夜三點鐘回信給學生，也體會了大班制教師不容易。為了吸引學生學習，她舉辦電子商務徵文比賽「如何用電子商務賺錢」，加強師生互動。

東海大學外文系四年級簡志峰，不僅以「輕輕學會嘸蝦米」在資訊教學科獲獎；他的「金字塔之謎」課程也在不限定科目得獎，是唯一雙科得獎的網路教師。

亞卓市宣布，第二屆全民學校開課比賽訂今年十月十五日至十二月卅一日進行，歡迎有興趣的學生或老師加入全民開課行列。



2001


國立中央大學
亞卓市-網路科展
National Central University
亞卓網路科展 颱風大贏
慶十週跨組參與兩颱風研究
分獲一、二名
四位特別獎得主 國小
災天灣台究研 展科路網屆首
高中地球科學
網路學習加選
升提率業結員學 力責師老輔學
通溝面對面斥排應不 學教路網
冠雙奪究研層斷孩女區災

2001
e-schoolbags

classroom clickers

民生報 91.6.6 今日話題 A3

電子書包 讓上課變輕鬆

黑板變成電子大白板 PDA取代書本 還能無限上網 北市試辦 師生都覺得有趣多了

【記者林麗雪／報導】前一陣子，台北市南湖國小五年四班學生林育正到蘭嶼國小進行城鄉交流，昨天他透過戲劇表演，與同學分享他在蘭嶼收到的「意外禮物」。當他演得正入戲，老師使用電子大白板呈現他的劇本內容，讓同學更能進入狀況，體會他要表現的意涵；落幕後，全班利用電子書包的評價投票功能，爲林育正的演出打分數。十秒鐘後，電子大白板顯示了：全班二十九名同學給林育正最高分四分，

語課時，傳統黑板由電子大白板所取代；PDA也取代了傳統書本；第十六課小說體裁的「最後一片葉子」全文同時出現在電子大白板及學生電子書包螢幕上；老師用手指輕輕一觸，紅色線條立即顯現那一段落是伏筆？那個句子是高潮？突然一位小朋友的電子書包斷訊，未連上線，電子大白板右下方訊號燈變色，講課老師馬上掌握現況。王資翔同學說，「上課用電子書包後，可不能打馬虎眼，老師一看就知道。」

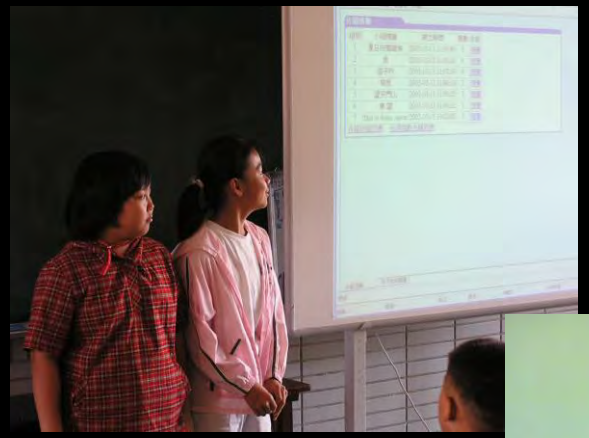
本，連接到哈書網，搜尋少年小說資料庫；小朋友的作品透過電子書包，與全班同學同時一起分享，帶給學生很大的成就感。

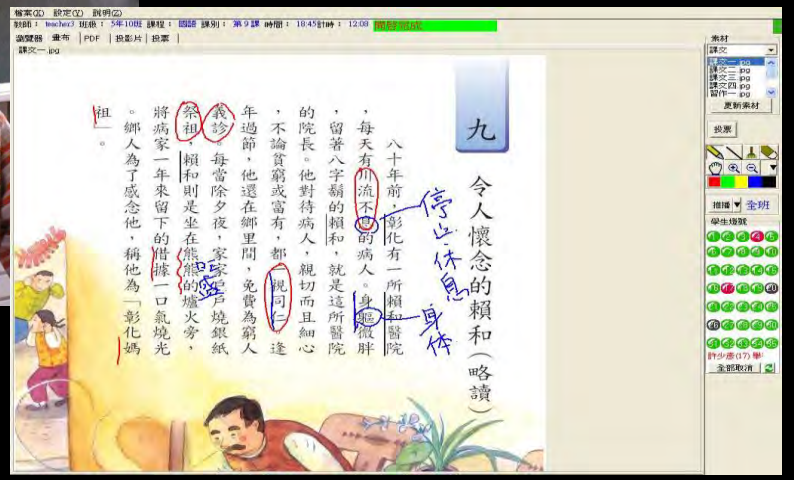
南湖國小五年級學生蔡函殷說，電子書包當然比書本好玩多了！重量又輕，比起每天背五、六公斤重的書包，快活多了！又能隨時上網找資料，和同學在班級的網站上討論功課、畫圖、寫作業，實在太有趣了。

北市教育局與中央大學資工系、生產電子書包的業者合作推動電子書包計畫，業者表示，目前每一電子書包售價約三萬二千元，預計三年後可降到一萬元左右，價格下降有助於全面推廣。北市教育局資訊室主任韓長澤則說，未來各級學校全面使用電子書包，家長必須付費購買，而教育局會提供免費的電子書包，給予低收入戶、弱勢族群學生使用。

2002

one tablet per student
or
1:1 Learning





1012
President Ma’s Visit

2004
EduCart

2002
mobile learning

learning
in the campus

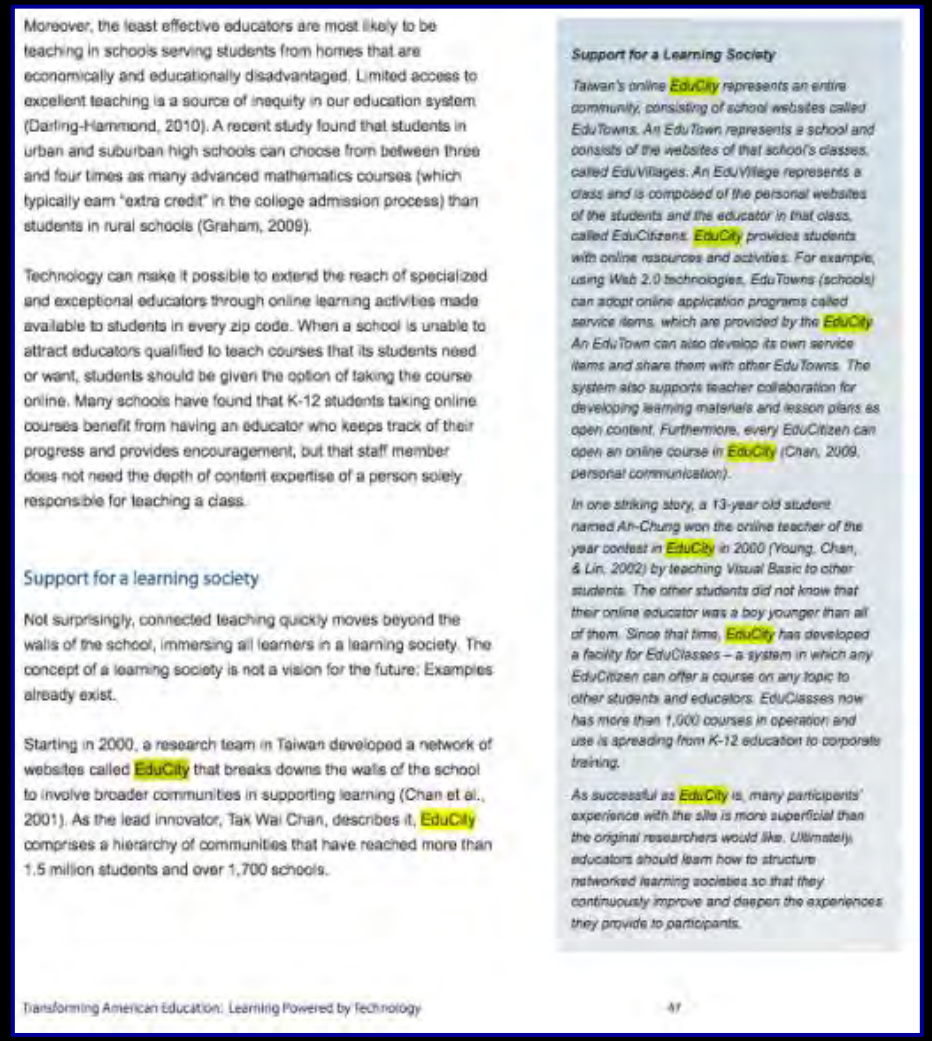
2002
mobile learning

Taipei Zoo
study

bird watching

USA: National Education Technology Plan Draft 2010

EduCity established in the early 2000s was the first learning society in the world



Moreover, the least effective educators are most likely to be teaching in schools serving students from homes that are economically and educationally disadvantaged. Limited access to excellent teaching is a source of inequity in our education system (Darling-Hammond, 2010). A recent study found that students in urban and suburban high schools can choose from between three and four times as many advanced mathematics courses (which typically earn "extra credit" in the college admission process) than students in rural schools (Graham, 2009).

Technology can make it possible to extend the reach of specialized and exceptional educators through online learning activities made available to students in every zip code. When a school is unable to attract educators qualified to teach courses that its students need or want, students should be given the option of taking the course online. Many schools have found that K-12 students taking online courses benefit from having an educator who keeps track of their progress and provides encouragement, but that staff member does not need the depth of content expertise of a person solely responsible for teaching a class.

Support for a learning society

Not surprisingly, connected teaching quickly moves beyond the walls of the school, immersing all learners in a learning society. The concept of a learning society is not a vision for the future: Examples already exist.

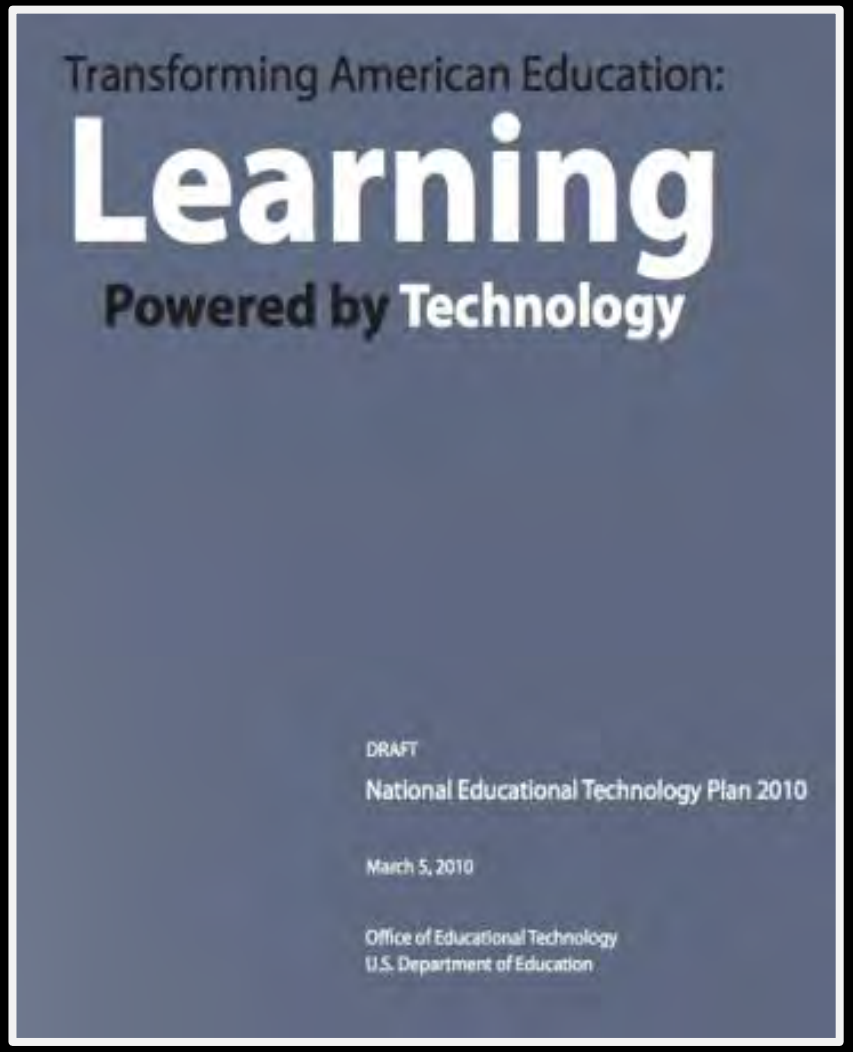
Starting in 2000, a research team in Taiwan developed a network of websites called EduCity that breaks downs the walls of the school to involve broader communities in supporting learning (Chan et al., 2001). As the lead innovator, Tak Wai Chan, describes it, EduCity comprises a hierarchy of communities that have reached more than 1.5 million students and over 1,700 schools.

Support for a Learning Society

Taiwan's online EduCity represents an entire community, consisting of school websites called EduTowns. An EduTown represents a school and consists of the websites of that school's classes, called EduVillages. An EduVillage represents a class and is composed of the personal websites of the students and the educator in that class, called EduCitizens. EduCity provides students with online resources and activities. For example, using Web 2.0 technologies, EduTowns (schools) can adopt online application programs called service items, which are provided by the EduCity. An EduTown can also develop its own service items and share them with other EduTowns. The system also supports teacher collaboration for developing learning materials and lesson plans as open content. Furthermore, every EduCitizen can open an online course in EduCity (Chan, 2009, personal communication).

In one striking story, a 13-year old student named Ah-Chung won the online teacher of the year contest in EduCity in 2000 (Young, Chan, & Lin, 2002) by teaching Visual Basic to other students. The other students did not know that their online educator was a boy younger than all of them. Since that time, EduCity has developed a facility for EduClasses – a system in which any EduCitizen can offer a course on any topic to other students and educators. EduClasses now has more than 1,000 courses in operation and use is spreading from K-12 education to corporate training.

As successful as EduCity is, many participants' experience with the site is more superficial than the original researchers would like. Ultimately, educators should learn how to structure networked learning societies so that they continuously improve and deepen the experiences they provide to participants.



But I noticed there was a seam there…

virtual learning community

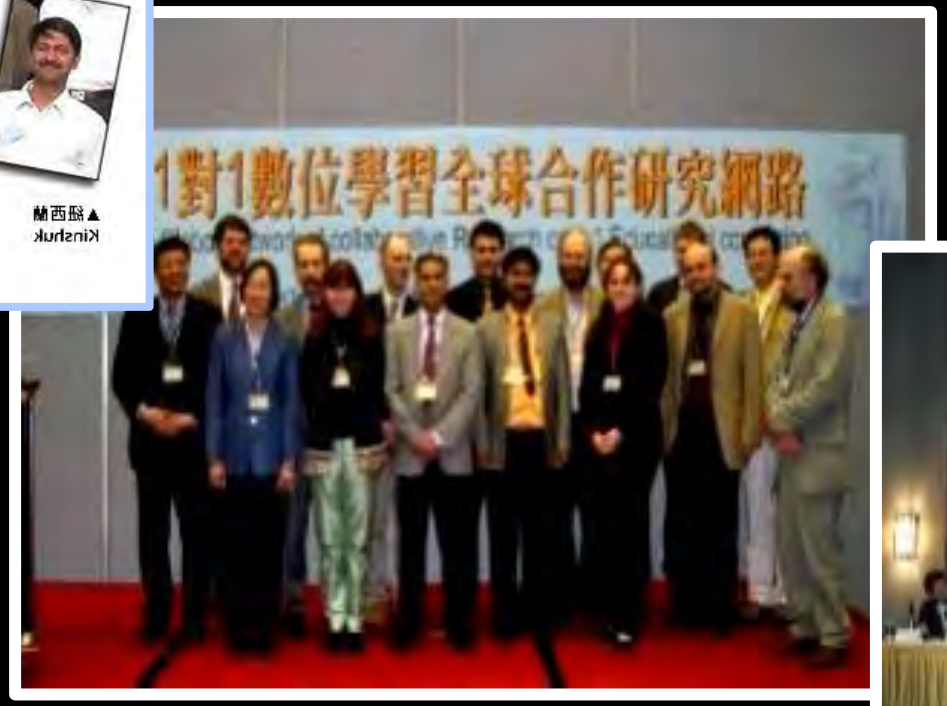
EduCities
(1.5 million people)

EduTowns
(2,500 schools)

EduVillages
(20,000 classes)

1:1 learning in physical space

Co-authoring
one-to-one Technology Enhanced Learning &
seamless learning notion



Seamless Learning

International Researcher Coauthors

Asia

Tak-Wai Chan, National Central University, Taiwan

Chee-Kit Looi, Nanyang Technological University, Singapore

Europe

Mike Sharples, Nottingham University, UK

Nicolas Balacheff, Laboratoire Leibniz, France

Pierre Dillenbourg, Ecole Polytechnique Fédérale de Lausanne, Switzerland

Marcelo Milrad, Växjö University, Sweden

Ulrich Hoppe, University Duisburg-Essen

America

Jeremy Roschele, Stanford Research International, USA

Roy Pea, Stanford University, USA

Elliot Soloway, University of Michigan, USA

Sherry Hsi, The Exploratorium, USA

Charles Patton, Stanford Research International, USA

John Cherniavsky, National Science Foundation, USA

Cathie Norris, University of North Texas, USA

Marlene Scardamalia, University of Toronto, Canada

Africa

Tom Brown, University of Pretoria, South Africa

Seamless Learning Space

seamlessly learning across over
learning scenarios from
Physical Space X Virtual Space X Social Space

Physical Space X Virtual Space: classroom, campus, home, museum, etc.
Social Space: individual, small group, class, online community, agents, etc.

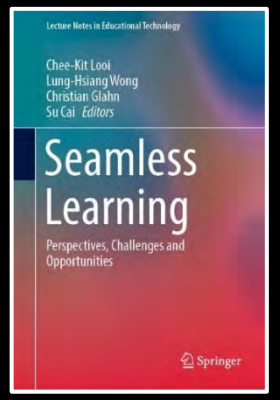
Seamless Learning: a long definition

(International Researcher Coauthors, 2006)

"Seamless learning implies that a student can learn whenever they are curious in a variety of scenarios and that they can *switch from one scenario to another easily and quickly* using the personal device as a mediator. These scenarios include learning individually, with another student, a small group, or a large online community, with possible involvement of teachers, mentors, parents, librarians, workplace professionals, and members of other supportive communities, face-to-face or at a distance in places such as classroom, campus, home, workplace, zoo, park, and outdoors. Seamless learning space refers to the collection of the various learning scenarios supported by one-to-one technology."

“… marked by a continuity of the learning experience across different environments.”

Mainly advocated by Lung-Hsiang Wong & Chee-Kit Looi



7 books on seamless learning

Imagination of metaverse

But much more beyond AR/VR/MR……

Metaverse VS Seamless World

Metaverse VS Seamless World

- **Metaverse** is an interconnected digital world that seamlessly integrates physical and virtual spaces (Chris Wang, MetaACES2022)

- **Seamless World** is a real world that seamlessly integrates physical and virtual spaces

PART 3: Seamless AI World

- We need to understand what the technology-infused world will be like in the future
- AI supported education and artificial learning companions
- Seamless learning
- **Seamlessly AI-empowered world**

We may define

Seamless AI World

A real world that seamlessly integrates all things, including physical and virtual spaces and empowered by AI

More specifically,

Seamless AI World

is a world in which resource

can be *seamlessly* and *equitably* accessible, *AI-empowered* and *safe!*

Seamlessness?

1. Talking about Seamless AI World, should we define 'seamlessness'?

2. If we should, will there be
   - accessibility seamlessness
     - digital support
   - continuity seamlessness
     - continuity of activity across time, physical & social spaces
   - resemblance seamlessness
     - digital resemblance

3. If we should, will there be
   - 'well-seamlessness
   - 'ill-seamlessness'