How To Use Chatbots and Intelligent Systems to Provide 24/7 Tutoring for Students

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The Real Purpose of this Webinar…

Who Am I

- Teaching at the university level since 1973
- Psychologist by training but have taught in both statistics programs and in business schools
- Now act as Chief Innovation Officer for Contact North | Contact Nord
- Now working on strategic foresight as a teacher at the University of Toronto (OISE) and University of Alberta and Athabasca University (MBA)
- Created the world's first fully online MBA in 1993-4 and have been building and working with technology enabled learning experiences ever since
- Worked for 15 years at the Open University (UK) and for 14 years at Athabasca University

Why Are we Doing This

- The best predictor of student success is the extent of student engagement.
- To engage students, we also need to support them
- We can support them in new ways using people + technology
- We can build a support eco-system that is intensely powerful, focused and efficient

The Community of Inquiry Model

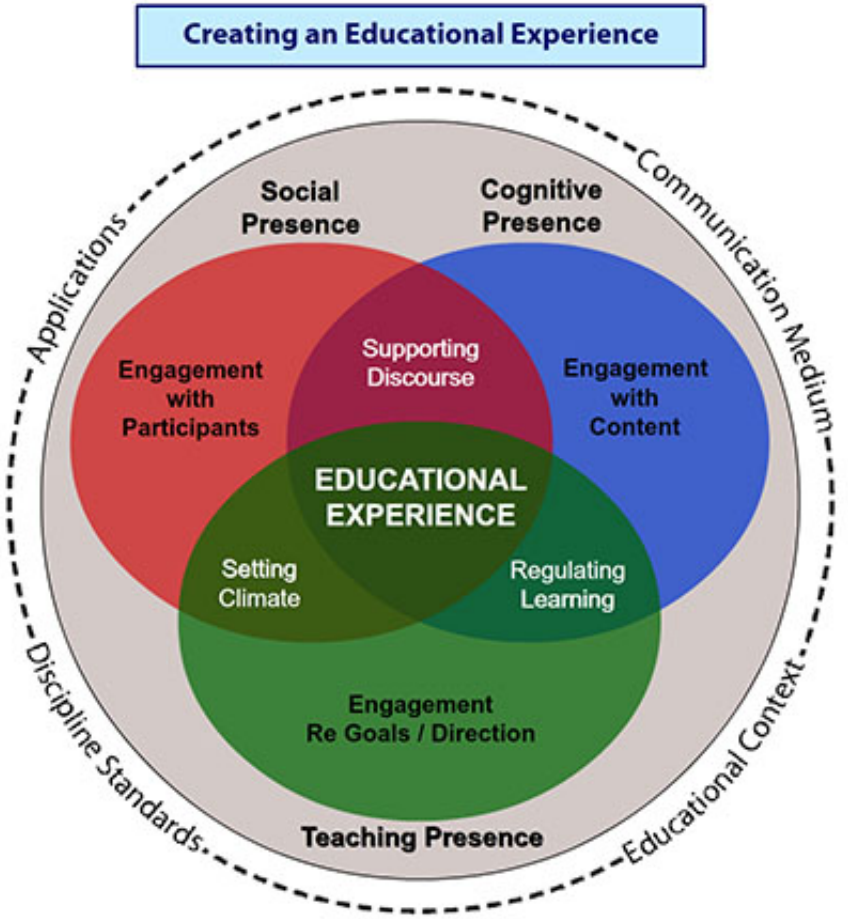
Developed by Randy Garrison and Terry Anderson, Walter Archer and others.

Widely used as a design framework.

Significant focus for research.

See more

https://coi.athabascau.ca/coi-model/ at:



Here is what I want to do..

- Offer an overview of what chatbots are and how they are currently being used
- Understand what it takes to deploy and support chatbots for tutoring as well as being clear about their limitations
- Explore the nudges when AI systems can provide to help students stay in the “zone of success”.
- Offer some suggestions about costs of deployment
- Look at “what’s next” for chatbots in higher education

By the Way..

- Chatbots are not new – they have been around since 1964..and have been evolving since.
- The best known are Siri, Microsoft's Cortana, Amazon Alexa, Google Assistant and IBM Watson.

Chatbots use..

- Chatbots use natural language processing (NLP) and natural language understanding (NLU) to engage in conversations with humans and connect that conversation to appropriate actions or tasks.
- Advanced AI systems (DeepMinds / Watson) are self-learning. Other systems have to be “taught” - different deployments of AI lead to different design, deployment requirements.

Understanding How Chatbots Work

What Chatbots Can Do

(based on Tamayo et al, 2020)

- ***Intelligent tutoring systems*:** a function already available in the eighties of the past century, and which can now be enriched with the possibility of customizing learning environments for each student, based on the analysis of their responses and their browsing trail through the digitized content.
- ***Improve student participation***: the aim is to take advantage of the tendency to use instant messaging systems through a *chatbot* that acts as a communication platform.
- ***Intelligent feedback***: on the design of the course, the subject, the operation of tutorials, and on information that once collected by the *chatbot* is sent to the teacher or the institution for analysis.
- ***Teaching assistants***: a *chatbot* can assist the teacher in performing the most repetitive tasks, follow the student's progress, or provide personalized feedback.

- ***Immediate help for the student*:** it allows to automate and provide in an immediate way habitual answers, both of administrative character and related to the contents of the subject.
- ***Alternative to Learning Management Systems (LMS)***: *chatbot* can perform functions traditionally integrated into LMS more dynamically, by providing access to materials in different formats, external links, doubt sections, messaging, etc.
- ***Mentoring functions*:** not only providing the students with information, but also guiding them in the search for it, for example through problem solving.
- ***Skills practice***: the *chatbot* can assume the role of patient, consumer, client, or citizen with whom students can practice the skills and techniques they have learnt in the subject.

Chatbots..

- Supplement and support the work of the instructor, they do not replace them
- Are independent of any specific LMS – they are “add on’s”
- Can work 24x7 and provide extensive support to students, especially if “trained” to answer known FAQ’s

5 Levels of Chatbot

Based on Mady Mantha at RASA

1. Notification Assistant (think Amazon)
2. Simple FAQ answers based on “rules” based questions.
3. More dynamic FAQ – contextual assistants (think Shaw)
4. More personalized assistants that “get to know you”
5. Truly conversational assistants with “deep knowledge” which they can customize to you and your patterns of work

Chatbot Types in Action..

- **Information based chatbots** – *"what is the method for calculating total factor productivity?…"*
- **Conversational chatbots** – used extensively in counselling and guidance work *"I seem to be struggling with making sense of online learning…"*
- **Task based chatbots** – designed to support very specific functions (admission, registration, assignment completion, appeals) - *"What do I need to do to secure permission for a late assignment…?"*
- **Interpersonal chatbots** – connecting the student to others – *"Is anyone else in my class struggling with regression? Can we team up?"*
- **Intrapersonal chatbots** – study companion to the student *"Chatbot, can you help me with regression analysis I seem to be struggling.."*

There are a Variety Chatbots

Open Source

- Botkit
- RASA
- BotPress

Pay for Use

- Engati
- Pandorabots – Mitsuk
- Watson Assistant
- LivePerson
- Ibenta
- Ada
- Vergic

Designing a Chatbot

- **Accurate knowledge representation** – how will the chatbot understand the intention behind a question or comment?
- **Answer generation strategy** – how will the chatbot find the "right" answer and what dbases does it connect to?
- **Administrative Knowledge** – what admin knowledge does the chatbot need (e.g. process of late submission of an assignment, exam deferment, etc.)
- **Pre-defining neutral answers -** when the chatbot is unsure of the answer it needs to provide or cannot locate appropriate material
- **Trivial conversation mode** – will the chatbot "chat" with a user on general topics (weather, sports, etc.) or not?

User Intent

- What does the user mean / need?
- Interpretation of intention linked to resources

Response Generation

- Access available information, materials using rubrics
- Use of past responses as a starting point (FAQs)
- Action execution

Dialogue Management

- Different persona's for different kinds of intention / student
- Conversational style

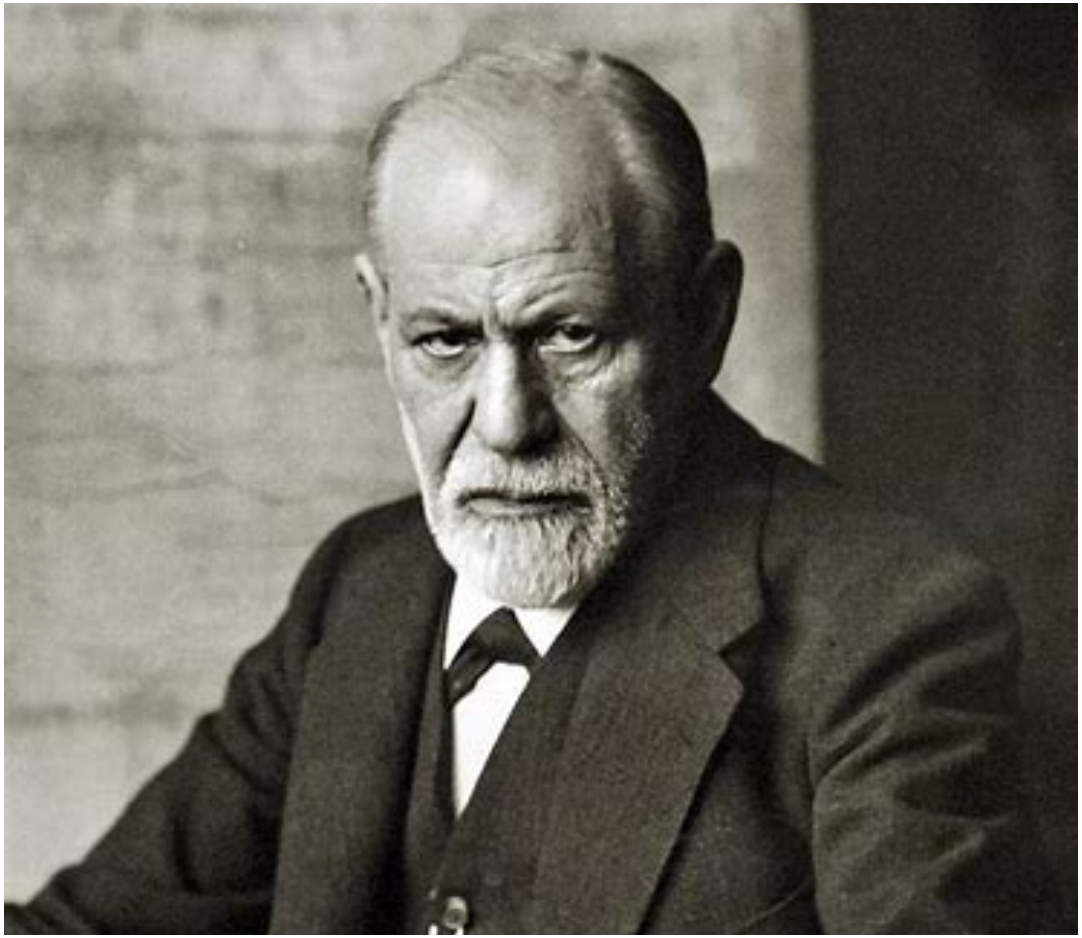
Chatbots Need…

- Training – input of student FAQ's for specific content, input of rubrics, regulations and process information.
- Character – the chatbot needs a persona (increasingly, AVITARs are being used)
- Access to substantial knowledge base
- Support from a human bot-trainer

Chatbots in Use: 10 Examples

FREUDBOT
Athabasca University

- Students interact (chat) with Sigmund Freud for 10' a week for the duration of a course.
- The chats focused on Freudian concepts, theories and biographical events.
- Moderate level of success – average number of chats = 27.7 with a strong level of "utility" derived from the chat in terms of learning outcomes.
- Freudbot uses visual images of Freud to reinforce key points



Reduce Drop Out by 21%+

Partnered with Admit-Hub

Meet Pounce

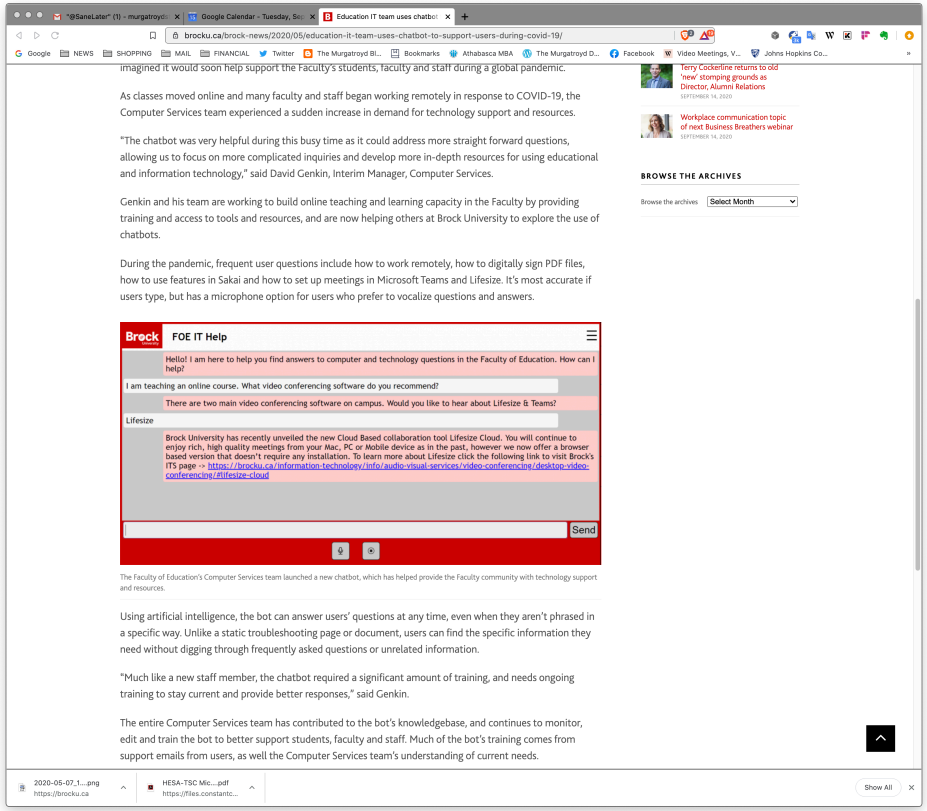
- Reminders
- Guided Tutorials
- Surveys
- FAQ Automation
- Targeted Human Support

Georgia State University

University of Huddersfield

- EMILE chatbot – skilled in conversations around the work of leading social theorists (Marx, Mead, Weber, Foucault).
- Has a first person or a third person conversational style option.

Brock University IT Chatbot



- IT Help desk chatbot
- Aims to deal with the 60-70% of routine queries, leaving staff to deal with more complex ones.

Bolton College: ADA Chatbot

- The chatbot is credited with helping the college increase student retention in the first 42 days of the academic year by providing positive personalized answers to repeatedly asked questions such as: “What is my next class and in which classroom will that be?”

Humber College International Recruitment

- Streamlined inquiry management via chatbot / CRM integration
- Gradually got the chatbot to answer more and more on inquiries and linked responses to CRM for human tracking

Alexa on Campus: Lancaster University

So Far…

- Library services
- Timetable information
- Sports bookings, library / study pod booking, tech support
- Support for students with disabilities
- Course summaries..

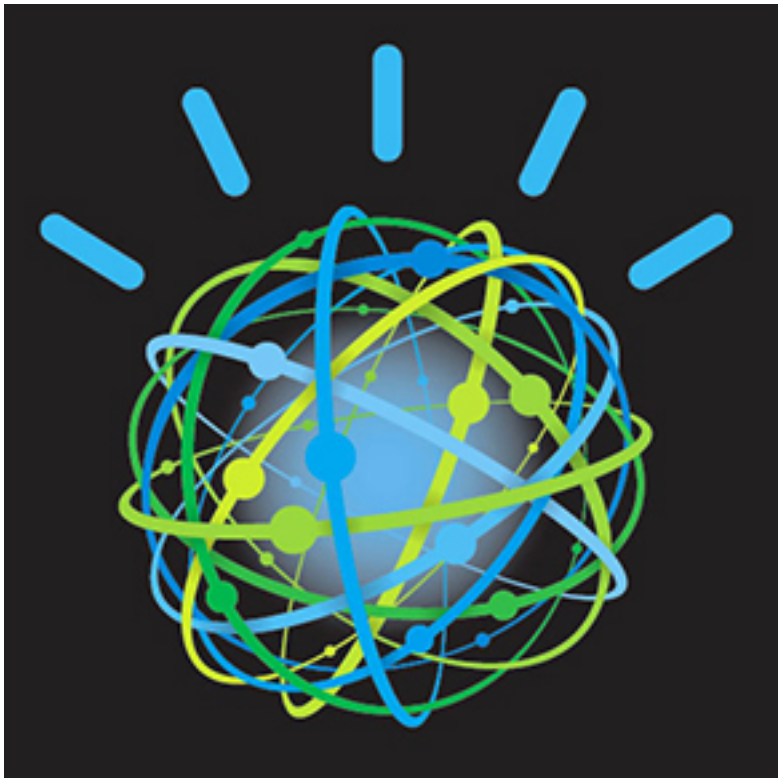
Athabasca University Virtual Co-Op

- With the new AI-powered program, students are thrown into the thick of the decision-making in the role of management trainees at a financial institution.
- The program delivers six major projects to students over four months with 30 challenging scenarios, including firing a staff member, working with a difficult boss, and building credibility in a new corporate environment.

University of Alberta

- IT 24x7 help desk.
- Answers 80% of questions asked of it.
- 20% have to be answered within 24 hours by a human.

York University (Ontario)



- Using IBM Watson as an enquiry engine for student services, library services, etc.
- Gears responses based on which program a student is enrolled in.
- Links all known data about the student so that Watson finds the appropriate response.
- Operates in free form text in English and French.

Bonus: Andi the Interview Coach

- Dynamic conversations using AI / Avitar via Skype
- Asks you to answer questions and then offers advice, based on your responses.
- Advice includes both content / attitude and emotions

Risks

- Security experts have identified three types of potential **chatbot** attacks. So far, these are mostly theoretical since, no major **chatbot** hacks have been reported —**yet**.
- Students and users could become frustrated given the range of possible answers available to a low-cost chatbot (unless you are using Watson or DeepMinds).
- Intrusion and privacy concerns
- Third parties can use / sell data.

Costs

- [It depends…]
- Programming costs – 250 hours
- Business Process Redesign Costs – 300-400 hours
- Content loading - anything from 5 hours to 500 hours
- Rough estimate: $50,000 - $80,000

What's Next?

Four Likely Developments

- Universal subject chatbots, such as those deployed by TutorMe offered independently of specific institutions – e.g. by subject or by topic within a subject (cognitive science / cognitive neuropsychology)
- More virtual co-op or simulations using chatbots + augmented/virtual reality
- More adaptive learning uses of chatbots
- More content finding and summarizing chatbots for revision / assessment support

The Ultimate Chatbot:

My Personal Study Trainer

Who…

- Tracks all of my activities and keeps me in the zone of success.
- Helps with assignments, course work and projects.
- Advises on course choice / career paths.
- Keeps track of my competences and capabilities and maintains my e-portfolio.

Thank You!

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