

# Exploring the diagnostic potential of AI-based chatbot interactions as part of L2 English reading computerised dynamic assessment

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# DD-LANG project (2022-26)



We aim to advance the **theoretical, empirical and practical basis** of L2 assessment for learning by bringing together dynamic and diagnostic assessment approaches

Thus, we address

- (1) **lack of systematicity** and **basis in theory** of learning / development in the assessment of L2 skills
- (2) **lack of individualisation** due to large groups and limited teacher time

We focus on reading and writing in English as a foreign language in upper secondary schools in Finland (16-18 -year-olds)

# Dynamic Assessment (DA): Diagnosis through intervention



DA based in Vygotsky's (2012) **Sociocultural psychology**: new cognitive abilities, including language, appear first on *inter-mental plane* (dialogic interaction) & later on *intra-mental plane* (internal, use of language as inner speech)

- Full diagnosis of abilities includes emergent abilities
- **Mediation** [intervening in cognitive processes] through interaction (hints, leading questions, feedback, model, example)
- Process may lead to 'ripening' of abilities, promotion of development (Vygotsky, 2011)

Purpose: not for learners to 'do better' on test, but to diagnose development; quality of mediation learner requires + responsiveness to it

# Bringing together of dynamic & diagnostic L2 assessment



Focus on developing reading in English

1) with mediation and

2) **with AI-based chatbot** (additional instruction AFTER learner works through mediation, completes item; learning opportunity)

# I Standardised mediation: reading for specific details



**1** Look at the key parts of the question and the options. Think about what the question is asking. Then try to find this information in the text, thinking about how you search for it.

**2** Once you think you found the place with the details you need, **look around this part** and think about the **meanings of words and phrases** you see. Try to connect them to the question and the options. Remember that the details in the text are often said in a different way than in the question.

You can also look for:

- The order of details, paying attention to **verb tenses** and words like *first* and *then*.
- How these details are connected, like **comparing** using *likewise*, or **contrasting** using *but*.
- Sometimes you need to choose the details that best match the question and the option.
- You can also use your knowledge about the topic to find the answer.

**3**

## II Chatbot interaction



Choose the best fitting answer to the question.

### Library

I recently wrote our legislators petitioning for silence to be added to the Endangered Species Act, but was told it was already extinct. Indeed, I search for it in vain. Impossible to walk into a restaurant or a grocery store without being exposed to music, or “music,” on the assumption that their taste is yours. In the doctor’s waiting room, the TV blasts cartoons. Yesterday, I sought refuge in my neighborhood library, needing to get some studying done. Turned out it had replaced the village pub as the gossip spot, mainly with the folks behind the desk. Then, after the car alarm outside had wailed for five minutes, the returned videos got checked in electronically. Beep – five seconds – beep, went on for 10 minutes.

Yes, it’s all my fault for not going through life plugged in to ear buds tuned to white noise.

– Michel Singher, Felton

What is the writer’s concern about the library?

Everyone gathers there and it’s too crowded

It is not only about books any

The customer receives no se

The library has poor soundpro

The staff keep talking and disturbi

Vita – AI-assistant

Why was the answer correct?

The correct answer is “The staff keep talking and disturbing others” because the text mentions that the library had become a gossip spot, particularly with the folks behind the desk. This suggests that the staff at the library were talking and potentially causing disturbances, which is disruptive especially for those who are trying to study or read in silence.

## II Chatbot interaction (contd.)



Learner: Why was the answer correct?  
Bot: The correct answer is "The staff keep talking and disturbing others" because the text mentions that the library had become a gossip spot, particularly with the folks behind the desk. This suggests that the staff at the library were talking and potentially causing disturbances, which is disruptive especially for those who are trying to study or read in silence.

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# Participants and data



- **The piloting data: 5 students in one upper-secondary school**
  - **Learner profiles**
  - **Group interview**
- **Upper secondary school students of English in 7 upper-secondary schools in Finland ( $n = 280$ , at the end of October)**
  - Of them, 131 engaged with the chatbot at least once
  - Learner profiles including reflections on the immediate experience with mediation and chatbot
  - Classroom observations



# Research question



**What diagnostic information** does information about students' interaction with standardised mediation and chatbot provide for the assessor/teacher?

# S112: changing the understanding of mediation/task in light of chatbot interaction



## Library

I recently wrote our legislators petitioning for silence to be added to the Endangered Species Act, but was told it was already extinct. Indeed, I search for it in vain. Impossible to walk into a restaurant or a grocery store without being exposed to music, or “music,” on the assumption that their taste is yours. In the doctor’s waiting room, the TV blasts cartoons. Yesterday, I sought refuge in my neighborhood library, needing to get some studying done. Turned out it had replaced the village pub as the gossip spot, mainly with the folks behind the desk. Then, after the car alarm outside had wailed for five minutes, the returned videos got checked in electronically. Beep – five seconds – beep, went on for 10 minutes. Yes, it’s all my fault for not going through life plugged in to ear buds tuned to white noise. – Michel Sinquer, Felton

Everyone gathers there and it’s too crowded

It is not only about books anymore

The customer receives no service

The library has poor soundproofing

The staff keep talking and disturbing others

why was the library being crowded not the right answer?

## S112: changing the understanding of mediation/task in light of chatbot interaction (contd.)



Selected option / Student query	Mediation / Chatbot's response
Everyone gathers there and it's too crowded	Level 1
The library has poor soundproofing	Level 2
The staff keep talking and disturbing others	Correct!
why was the library being crowded not the right answer?	The text does not mention anything about the library being too crowded. Instead, it specifically mentions that the library has become a gossip spot, particularly due to the staff behind the desk. This is why the correct answer is that the staff keep talking and disturbing others. It's important to carefully read the text and base your answers on the information provided in the text.

# S112: changing the understanding of mediation/task in light of chatbot interaction (contd.)



Choose the best fitting answer to the question.

## Rhinos

The herd of black rhinos at Chester Zoo also play a vital role in saving the species from extinction. Conservation breeding programmes are critical in ensuring there's a sustainable population that can then be reintroduced to the wild. Our scientists are working right now with other organisations to make sure genetic diversity of the wild population is maintained through conservation breeding in zoos, should the sad day ever come when there are no rhinos left in the wild.

Why are the rhinos at Chester Zoo significant?

Some individuals can be released into the wild

They are an extinct species in the wild

They are descended from a very old breed

They are safe from illegal hunting there

They help to keep the gene pool varied



the text does say some can be reintroduced to the wild, why is that not the right answer here?

## S112: changing the understanding of mediation/task in light of chatbot interaction (contd.)



Student's query	Chatbot's response
<p>the text does say some can be reintroduced to the wild, why is that not the right answer here?</p>	<p>While the text does mention that some rhinos can be reintroduced to the wild, the main significance of the rhinos at Chester Zoo, as stated in the text, is their role in conservation breeding programmes. These programmes are critical in ensuring a sustainable population and maintaining the genetic diversity of the wild population. So, while reintroduction to the wild is a part of the process, the primary significance of the rhinos at the zoo is their contribution to keeping the gene pool varied.</p>

## S112: reflection on the chatbot interaction



**R112:** I think the chatbot was really good because I was able to ask why this answer wasn't right. And I think that in those reading comprehension tasks, I always give an answer, and then it's wrong, and then I think that I still don't understand why my answer was wrong...

**T:** And you received a proper response from it?

**S112:** Yes, I got a proper answer. I thought it was really well formulated that way, too...

**R:** Why exactly that question?

**S112:** Well, maybe the fact that then I understand that, what I've been thinking wrong, or how I've read the text wrong, and, just that there's a word, like, “never” or “always” or something like that, that I've, like, missed, and then, because of that, I've missed something, and then it explains to me that, hey, it says something like this and that's why it can't be right.

# S111: when you need to read between the lines



Choose the best fitting answer to the question.

## Sports Books

Laughing in the Hills by Bill Barich (1980)

As mid-life crises go, Barich's, aged 35, is special. Five rejected novels, mother and mother-in-law dead of cancer five weeks apart, no money, no job, wife with suspected brain tumour. Craving structure, he found it only studying the Daily Racing Form, picking horses methodically and placing small bets. He then told his wife (tumour: false alarm), he'd be moving to a motel next to San Francisco's Golden Gate Fields racetrack, "convinced there was something special about racing and I wanted to get to the heart of the matter." There was. He did. His write-up of that time is spectacularly good.

What is special about Bill Barich's book?

Barich based the book on news about races rather than on the actual races

Barich captures something of the very essence of a particular sport

Barich focuses more on his personal problems than on sports

Barich provides advice based on his own experience with betting

Barich ran away from challenges by focusing on writing about racing



Why is the answer "he ran away from challenges etc.." wrong?

## S111: when you need to read between the lines (contd.)



Student's query	Chatbot's response
<p>Why is the answer " he ran away from challenges etc.. " wrong?</p>	<p>The answer "Barich ran away from challenges by focusing on writing about racing" is incorrect because the text does not suggest that Barich was running away from his challenges. Instead, it shows that during a difficult time in his life, he found structure and a special interest in racing. He moved to a motel next to a racetrack and studied racing methodically, which suggests a deep engagement with the sport rather than an escape from his personal problems. Therefore, the correct answer is "Barich captures something of the very essence of a particular sport" because he immersed himself in the world of racing and was able to write about it in a way that captured its essence.</p>



# S111: when you need to read between the lines (contd.)



Choose the best fitting answer to the question.

## Volunteering in Hospitals

Royal Voluntary Service has been there for the National Health Service since the beginning - and we're looking for determined people to keep this tradition going. When you offer your sympathy, commitment and skills as a hospital volunteer, you're helping to improve a patient's experience, support their recovery and ensure that they can return home safely, reducing the chance of them returning as patients. You can also offer help to staff and visitors by volunteering in one of our Royal Voluntary Service Hospital Shops or Cafés. If you haven't tackled anything quite like this before, don't worry. We have an experienced team of people who specialise in voluntary work in hospitals and can help you make the most of your time with us. They'll be ready to guide you through the whole process with plenty of support, showing you how to volunteer at a hospital and answering all of your questions.

What is mentioned as an example of volunteer work?

Creating a positive atmosphere in the hospital

Helping hospital staff in daily caring routines

Providing patients with basic medical help

Selling refreshments at the hospital canteen

Visiting patients at home after the hospital stay

Isnt this answer wrong because the text doesn't specify what kind of work is done for the shops of cafes?

## S111: when you need to read between the lines (contd.)



Selected option / learner's query	Mediation / Chatbot's response
Creating a positive atmosphere in the hospital	Level 1
Helping hospital staff in daily caring routines	Level 2
Selling refreshments at the hospital canteen	Correct!
Isn't this answer wrong because the text doesn't specify what kind of work is done for the shops or cafes?	<p>The text mentions that volunteers can "offer help to staff and visitors by volunteering in one of our Royal Voluntary Service Hospital Shops or Cafés." While it doesn't explicitly state what kind of work is done in the shops or cafes, it's reasonable to infer that selling refreshments could be one of the tasks, as this is a common activity in such settings. Therefore, the answer "Selling refreshments at the hospital canteen" is not wrong. It's important to remember that in reading comprehension exercises, sometimes you need to make reasonable inferences based on the information provided.</p>

# Discussion



- There is potential for learner interactions with the chatbot, focusing on the task at hand, to **complement** standardised mediation (focusing on developing learners' L2 English reading ability)
- Studying longitudinally potential changes in learner engagement with chatbot - whether there can be a shift from text-specific queries to those focusing on reading development
- Learner performance with mediation + chatbot discussions as basis for classroom interventions
  - What changing learner queries beyond the task at hand can allow for



# Kiitos! Thank you!

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