Linking Second Language Acquisition Research and Digital Language Learning

Detmar Meurers
University of Tübingen
based on collaborative research:
http://icall-research.de

21st Annual Conference of the Estonian Association for Applied Linguistics
Tallinn — April 27/28, 2023
Introduction

- Schools going digital is a common topic in public discourse, e.g.:

  Computers in all schools, all students at the computers – this is the program the ministers of education want to realize quickly.

  [Spiegel No. 47 / 18.11.1984]
In foreign language education, computers are being used

- to increase **motivation** through authentic, multimedia material
  - authentic language material from the target language context (websites, audios, videos)
  - curated language learning material

- to support **communication** with native speakers (using audio, video)
  - asynchronous, e.g., Email, . . .
  - synchronous or asynchronous, e.g., Skype, WhatsApp, Snapchat, . . .

- to mechanically **practice** vocabulary and grammar
  - mechanically = without modeling the learner, providing feedback

→ Computer are used to provide and exchange information & materials.
Beyond computers as digital materials

- More recently, Artificial Intelligence (AI) has become a popular buzzword in Education
  - esp. related to ChatGPT,
  - but usually illustrated with robots.

- What is AI and what opportunities can it potentially provide for (foreign language) education?
What is Artificial Intelligence?

- AI = imitating abilities with the computer for which a human needs intelligence

- traditional AI approach, since the 50s: make knowledge and rules explicit
  - successful: e.g., Deep Blue beat chess world champion Garry Kasparov in 1997
  - limited: knowledge and rules not widely available & lack of robustness

- machine learning approach, since the 80s: systems learning from data
  - successful: (only) where a lot of data is available
  - limited: to make predictions, labeled training data is needed
What is Artificial Intelligence? (II)

- AI is increasingly used in practice since 2011: digital voice assistant Siri
  - typically hybrid approaches (“Don’t guess if you know.”)
  - digital assistants, dialog systems in cars, machine translation, recommender systems

- Self-supervised machine learning approach using deep neural networks (ChatGPT, etc.)
  - challenge: requires machine learning of billions of parameters
  - idea: use texts as “labeled” training data by predicting masked words
  - result: Large Language Models (LLM) trained on \(\approx\) a billion words for GPT in 2018 to \(\approx\) a trillion now

Note: LLMs know about the world only through the language that they learn to predict.

“The boundaries of my language are the boundaries of my world.” (Wittgenstein)
Large Language Models in Practice: ChatGPT

- What can we already do with large language models?

- Potentially interesting opportunities for education.
  - Prompts support generating texts and dialogues
  - generating learning activities (and solving them)
Pretend to be an English tutor and teach me the difference between past perfect and simple past.

Hello! I’d be happy to help you understand the difference between the past perfect and the simple past tenses in English. Let’s take a closer look at each one.

1. **Simple Past:**
   The simple past tense is used to describe actions or events that occurred and were completed at a specific point in the past. It is often used with time expressions such as "yesterday," "last week," "in 2010," etc. The simple past tense is formed by adding "-ed" to the base form of regular verbs, or using the past form of irregular verbs.

   **Examples:**
   
   - She watched a movie last night. (regular verb)
   - He ate his breakfast this morning. (irregular verb)

2. **Past Perfect:**
   The past perfect tense is used to describe an action or event that was completed before another action in the past.
Limitations of Large Language Models

Being based on likely language sequences, systems such as ChatGPT cannot systematically

- provide reliable **knowledge**: GPT “hallucinates” whatever is needed to produce well-formed language
- perform **abstractions**: linguistic analysis, logical inferences
- detach from the social and cultural context of the language trained on → **bias**
- model **learners** and how to adaptively foster learning
Limitations: Linguistic analysis

Certainly! Let's practice using the simple past and past perfect tenses. I'll provide you with a short paragraph that has a few missing verbs. Your task is to fill in the blanks with the correct verb forms. Here's the paragraph:

Yesterday, Jane (1) her friend Mary for a coffee. Before they (2) each other, Jane (3) a book about a similar topic they (4) during their conversation. Jane (5) Mary about the book, and they (6) an interesting discussion about it.

Fill in the blanks using the following verbs in either simple past or past perfect tense: 'meet', 'read', 'have', 'discuss', 'tell', 'finish'.

Remember to consider whether the action was completed in the past or if it happened before another action in the past. Good luck!

1 meet

Great, you've got the first one correct! The simple past tense is used for actions completed in the past. Now try filling in the rest of the blanks with the correct verb forms. Here's the paragraph again with the first verb filled in:
Apologies for the confusion, and you are absolutely right! The correct past form of "meet" is "met." Here's the corrected paragraph with the first verb filled in:


Please proceed with filling in the remaining blanks.

2 have met

Good job! You've used the past perfect tense correctly for the second verb, showing that the action of meeting happened before another action in the past. Here's the updated paragraph:

Yesterday, Jane met her friend Mary for a coffee. Before they had met each other, Jane [3] a
Limitations: Bias

Create a class test about social media.

Title: Social Media Test

Name: ______________________
Date: ______________________

Instructions: This test consists of 20 questions related to social media. Read each question carefully and choose the best answer from the options provided. You have 60 minutes to complete the test. Good luck!

Multiple Choice Questions (2 points each):

1. Which of the following is NOT a common feature of social media platforms?
   a) User profiles
   b) Instant messaging
   c) Algorithmic news feed
   d) Automatic dishwashing

2. In terms of social media, what does UGC stand for?
   a) User-Generated Content
   b) Universal Graphics Consortium
   c) Unique Geographical Coordinates

Send a message...
Limitations: Bias (II)

c) Astroturfing
d) Phishing

True or False (1 point each):

11. True or False: Social media platforms can have both positive and negative effects on mental health.
12. True or False: Social media algorithms are designed to show users only the content they agree with.
13. True or False: Social media platforms have no responsibility for the content posted by their users.
14. True or False: Instagram and Snapchat are examples of image-based social media platforms.
15. True or False: It is impossible to make a living through social media.

Short Answer Questions (3 points each):

16. Briefly explain the concept of "FOMO" and how it relates to social media.
17. Describe two potential risks associated with oversharing personal information on social media platforms.
18. Name two ways businesses can use social media for marketing purposes.
19. Explain the term "echo chamber" in the context of social media.
20. List three benefits of using social media for educational purposes.
Towards AI-based tools for foreign language learning

- Digitalization and AI are not values in themselves – it is essential to consider
  - what concretely we want to facilitate,
  - to solve which real desiderata of the educational context,
  - based on which scientific insights into learning and teaching (SLA, psychology, pedagogy, ...).
What do we want to facilitate?

- **Interactivity**
  - facilitate interactive activities and tutorial dialogue
  - provide feedback, stepwise leading to successful task completion

- **Adaptivity**
  - provide materials at the learner’s level (by searching/generating)

⇒ How? It requires AI methods to
  - analyze and generate **language**
  - model **learners** and their development towards the curricular **learning goals**
  - analyze and generate adaptive learning **activities**

⇒ Why? To support individual learners (and teachers)
  - How is this grounded in research on the mechanisms of foreign language learning?
Research on Foreign Language Teaching & Learning

- Systematic Second Language Acquisition Research (SLA)
  - since the 60s (Corder 1967; Selinker 1972)
  - recognized as a discipline since around Larsen-Freeman (2000)
  - foundational SLA research, Instructed SLA (ISLA), Foreign Language Teaching and Learning (FLTL)

- Goal is to understand factors and mechanisms involved in SLA
  - and to make use of them for effective teaching and learning

- What key factors have been identified, and how can digitalization become relevant for those?
  - Input
  - Noticing and Focus-on-Form
  - Practice, Feedback
  - Output, Interaction
  and the importance of Individual Differences in all of this.
Key Factors: **Input**

- **Input Hypothesis** (Krashen 1985)
  - access to comprehensible input at $i+1$ is essential
  - input should be one step more complex than the interlanguage of the learner

⇒ AI-based digital tools can help us search for $i+1$ input:
  - SyB: Syntactic Benchmark (http://complexity.schule, Chen & Meurers 2019)
  - FLAIR (http://flair.schule, Chinkina & Meurers 2016)
The children had three important traumatic experiences they went through. The gang violence and poverty at home, the dangers of travel and to be alone and illegal in the US. Also Lara saw gun violence, when she was a small child and had to change the neighbourhood, where everything was new for her. Both of them had the experience of violence at a little age but both of them got support. The children from the local shelters and the organisation KIND, who provides pro-bono lawyers to represent unaccompanied minors, and Lara from her dad, who tries to take of her fears. Because of him, Lara has the feeling of securnes. She wears a bullet proof cape from a fairy tale, what tells her, her dad. The children feel secure in the shelters, where they get new clothes and other basic needs like food.
Your Position in Scale

Syntactic Measure:

Mean Length of Clause

Challenge
Challenge Articles

Ozone pollution drifts over from Asia, shows up in the air over California
CARMEL VALLEY, Calif.? High above the Big Sur coast, atmospheric scientist Ian Falcone is detecting high levels of pollution on the edge of the continent. His findings are surprising because the place should have some of the country's cleanest air. From an astronomical observatory in the Santa Lucy...

Educational gaming is catching on, especially in science class
MILWAUKEE, Wis.? The goal of the game "Citizen Science" is to save Lake Mendota in Wisconsin from pollution. To save the day, players must do all of the usual video game stunts, like travel through time or talk to animals. "Citizen Science" is just one of many video games developed by Games + Learn...

Latin America becoming fertile ground for online university courses
ARMENIA, El Salvador? Roosevelt Palacios sports braces on his teeth and a curly mop of hair. At 16, he finds high school boring. So after school, he logs onto his computer and hunts for challenges. He's found them in difficult online courses offered by professors at Stanford University and Massac...
Challenge Articles

U.N. working group suggests U.S. work on racial reconciliation
WASHINGTON ? The United States should consider reparations to African-American descendants of slavery, establish a national human rights commission and publicly acknowledge that the trans-Atlantic slave trade was a crime against humanity, a United Nations working group said Friday. The U.N. Working ...

French police make woman remove clothing on Nice beach after burkini ban
Photographs have emerged of armed French police confronting a woman on a beach and making her remove some of her clothing as part of a controversial ban on the burkini. Authorities in several French towns have implemented bans on the burkini, which covers the body and head, citing concerns about rel...

A symphony of second opinions on Mozart?s final illness
For classical music lovers, December 5 may be the saddest day of the year. At 12:55 a.m., 225 years ago, Wolfgang Amadeus Mozart drew his last breath. Later, he was unceremoniously buried in a common grave ? as was the custom of his era ? in the St. Marx cemetery, just outside the Vienna city limits...
From research to a tool useful in practice

- An exclusive focus on adaptive input is too academic.

  + Support adaptive selection of material that is rich in developmentally proximal language.
    ⇒ Enable teachers to specify overall proficiency level and pedagogically-focused linguistic target forms.

  + Support motivating reading tasks for learners!
    ⇒ Enable learners to search for texts that fit their individual interests!

⇒ FLAIR: Form-focused Linguistically Aware Information Retrieval
  - global complexity classification according to GER A1–C2.
  - identification of all language means on the official school curriculum for English
FLAIR Search Engine (http://flair.schule, Chinkina & Meurers 2016)

Search
Click on the search icon below and type in a query. FLAIR will fetch the top results from the Bing Search Engine.

Configure
Configure the settings: text (difficulty, length) and language (the passive, wh- questions, academic vocabulary, ...). You can export the settings to apply them to all further searches. FLAIR will re-rank the documents in terms of these settings.

Enter a query
climate change site:www.bbc.com

English

50 Results

CANCEL SEARCH
1. What is climate change? A really simple guide - BBC News
   Climate change is a shift in those average conditions. The rapid climate change we are now seeing is caused by humans using oil, gas and coal for their homes, factories and transport. When...

2. A brief history of climate change - BBC News
   Climate change hardly registers on the agenda, which centres on issues such as chemical pollution, atomic bomb testing and whaling. The United Nations Environment Programme (Unep) is formed as a ...

3. Climate change: IPCC report warns of ‘irreversible’ impacts ... - ...
   The Intergovernmental Panel on Climate Change says that humans and nature are being pushed beyond their abilities to adapt. Over 40% of the world’s population are “highly vulnerable” to ...

4. Climate change: 12 years to save the planet? Make that 18 mo...
   Prince Charles has stressed how important the next 12 months are in tackling climate change. One of the understated headlines in last year’s IPCC report was that global emissions of carbon dioxide...

5. Climate change: Young people very worried - survey - BBC News
FLAIR: enriching pedagogically targeted language means

The law that could make climate change illegal - BBC Future
Climate change is a global problem – if it is not tackled everywhere, it will affect everyone. The modern world is also incredibly intertwined: products – and resultant emissions – made in one...

Climate change: US formally withdraws from Paris agreement
After a three-year delay, the US has become the first nation in the world to formally withdraw from the Paris climate agreement. President Trump announced the move in June 2017, but UN regulations ...

Climate change: Can an enormous seaweed farm help curb it?
He's confident his Seafields floating farm will draw sufficient CO2 from the air to moderate the effects of climate change, while also earning its backers carbon credits. At 55,000 sq km (21,200 ...

Plant-based diet can fight climate change - UN - BBC News
Climate change poses a threat to the security of our food supply. Rising temperatures, increased rain and more extreme weather events will all have an impact on crops and livestock.

The climate films shaping society - BBC Future
The law that could make climate change illegal - BBC Future


<table>
<thead>
<tr>
<th>Text level</th>
<th>Sentences</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1-B2</td>
<td>149</td>
<td>2802</td>
</tr>
</tbody>
</table>

One of the most robust laws on climate change yet has been created in Denmark. Can legislation really make failing to act on climate change illegal?

Imagine this: it’s 2030 and a country has just missed its target for cutting carbon emissions, that was set back in 2020. People are frustrated, but several governments have come and gone since the goal was set. “Don’t blame us,” the current government says. “We didn’t take the decisions that led us here.”

The short-term cycles of government can be a real problem for climate change. Even if climate goals are laid down in law, there can often be few concrete measures to stop a succession of governments from taking decisions that collectively end up with them being missed.

But a new and ambitious climate law recently passed in Denmark tries to find a way around this problem, and some of the other common pitfalls of climate laws. It makes Denmark one of a small number of countries beginning to provide new blueprints of how government can genuinely tackle climate change. Its law could turn out to be one of the closest things yet to a global solution.
Key Factors: **Noticing** and **Focus-on-Form**

- Input alone only results in **Basic Varieties** (Klein & Perdue 1997).

- Some attention to forms crucial: **Noticing Hypothesis** (Schmidt 1995)

- Foreign language learners need a **Focus-on-Form** (Long 1991; Lightbown 1998).
  - Why? to overcome partial or missing competencies
  - How? **Input enhancement** to increase salience (Sharwood Smith 1993)

⇒ AI-based digital tools can support Input Enhancement (IE):
  ⇒ Visual Input Enhancement of the Web (Meurers et al. 2010)
  ⇒ Functional IE: Generation of questions targeting sentences with relevant forms (Chinkina & Meurers 2017)
Cows also 'have regional accents'

Cows have regional accents like humans, language specialists have suggested.

They decided to examine the issue after dairy farmers noticed their cows had slightly different moos, depending on which herd they came from.

John Wells, Professor of Phonetics at the University of London, said regional twangs had been seen before in birds.

The farmers in Somerset who noticed the phenomenon said it may have been the result of the close bond between them and their animals.

Farmer Lloyd Green, from Glastonbury, said: "I spend a lot of time with my ones and they definitely moo with a Somerset drawl."
Cows also 'have regional accents'

Cows have regional accents like humans, language specialists have suggested.

They decided to examine the issue after dairy farmers noticed their cows had slightly different moos, depending on which herd they came from.

John Wells, Professor of Phonetics at the University of London, said regional twangs had been seen before in birds.

The farmers in Somerset who noticed the phenomenon said it may have been the result of the close bond between them and their animals.

Farmer Lloyd Green, from Glastonbury, said: "I spend a lot of time with my ones and they definitely moo with a Somerset drawl."

In der Natur ist der Herbst die Zeit, wenn die Blätter an den Bäumen sich verfärben. Das Wasser in den Bäumen zieht sich zurück in die Äste, den Stamm und die Wurzeln. Die Blätter
Key Factors: Practice and Feedback

- Skill Acquisition Theory (DeKeyser 2005)
  - Teaching provides declarative knowledge, then practice is needed for automated, proceduralized skills.
  - Goal: fluent ability that does not bind attention

- Feedback is one of the most effective factors in supporting learning (Hattie & Timperley 2007).

- How can students effectively practice, given the large individual differences?
  - Without adaptive activity selection and scaffolding feedback at home, effective practice is not possible.

- How can students receive activities at their level and feedback?
  - limited time with teachers
  - dependence on support at home bad for educational equity

⇒ Intelligent tutoring system: FeedBook (Rudzewitz et al. 2017; Meurers et al. 2019)
Grammar check: Problems
Everyone has got problems. What could these people do differently?

0. Gillian is sad. Her mother never has any time for her.
If Mrs. Collins had more time for Gillian, Gillian wouldn’t be so sad.

1. Mrs Collins feels bad. She should listen more to Gillian.
If she listens more to Gillian, she feels better.

2. Gwynn is very disappointed. Gillian doesn’t like Wildings School as much as she thought.
If Gillian liked Wildings School as much as she thought, she would like it even more.

CYP 2 Grammar check: Problems
Everyone has got problems. What could these people do differently? Use conditional clauses in your answers.

2. Welcome to Wales

0. Gillian is sad. Her mother never has any time for her.
If Mrs. Collins had more time for Gillian, Gillian wouldn’t be so sad.

1. Mrs Collins feels bad. She should listen more to Gillian.
If she listens more to Gillian, she feels better.

2. Gwynn is very disappointed. Gillian doesn’t like Wildings School as much as she thought.
If Gillian liked Wildings School as much as she thought, she would like it even more.

3. George and Rajiv feel bad because they don’t have a present.
With conditional clauses (type 2), we use the simple past in the if-clause, not the simple present.

Feedback for "If she listens more to Gillian, she..."
Hilfreich? [ ] Ja [ ] Nein

OK
Mr Lambraki is checking flights to Greece. Read the information he has found on the two airlines and use the adjectives below to compare them.

- expensive (ticket)
- early (departure)
- attractive (shopping on board)
- good (choice of food offered on board)
- healthy (food and drinks)
- suitable (airport)
- cheap (tickets for shuttle bus)
- friendly (service on board)
- easy (online booking)

<table>
<thead>
<tr>
<th></th>
<th><strong>Midair</strong></th>
<th><strong>Air-Con</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>London – Athens from 39 pounds</strong></td>
<td><strong>London – Athens from 57 pounds</strong></td>
</tr>
<tr>
<td></td>
<td><strong>departure 7.00 am</strong></td>
<td><strong>departure 12.15 pm</strong></td>
</tr>
<tr>
<td></td>
<td><strong>non-stop</strong></td>
<td><strong>via Berlin</strong></td>
</tr>
<tr>
<td></td>
<td><strong>small choice of duty free articles for shopping on board</strong></td>
<td><strong>all international brands for shopping on board</strong></td>
</tr>
<tr>
<td></td>
<td><strong>low-calorie and vegetarian food available</strong></td>
<td><strong>snacks: crisps and chocolate bars</strong></td>
</tr>
<tr>
<td></td>
<td><strong>from Gatwick only 28 miles from London</strong></td>
<td><strong>from Stansted only 40 miles from London</strong></td>
</tr>
<tr>
<td></td>
<td><strong>tickets for shuttle bus are 10 euros</strong></td>
<td><strong>tickets for shuttle bus are 10 euros</strong></td>
</tr>
</tbody>
</table>

1. The tickets at Air-Con are expensiver than at Midair.

2.
FeedBook: Feedback on language forms

Off to Greece again
Mr Lambraki is checking flights to Greece. Read the information he has found on the two airlines and use the adjectives below to compare them.

LIF8R: Comparison of adjectives

expensive (ticket) · early (departure) · attractive (shopping on board) · good (choice of food offered on board) · healthy (food and drinks) · suitable (airport) · cheap (tickets for shuttle bus) · friendly (service on board) · easy (online booking)

<table>
<thead>
<tr>
<th>Midair</th>
<th>Air-Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>London – Athens from 39 pounds</td>
<td>London – Athens from 57 pounds</td>
</tr>
<tr>
<td>departure 7.00 am</td>
<td>departure 12.15 pm</td>
</tr>
<tr>
<td>non-stop</td>
<td>via Berlin</td>
</tr>
<tr>
<td>small choice of duty free articles for shopping on board</td>
<td>all international brands for shopping on board</td>
</tr>
<tr>
<td>low-calorie and vegetarian food available(^1)</td>
<td>snacks: crisps and chocolate bars</td>
</tr>
<tr>
<td>from Gatwick only 28 miles from London</td>
<td>from Stansted only 40 miles from London</td>
</tr>
<tr>
<td>tickets for shuttle bus are 10 euros</td>
<td>tickets for shuttle bus are 10 euros</td>
</tr>
</tbody>
</table>

1. The tickets at Air-Con are expensiver than at Midair.
2.
Welcome to Wales

B1 Gillian’s diary
Read Gillian’s diary entry and complete these sentences.

**Friday 23rd September**
We’ll drive to the north coast tomorrow and have a look at two boarding schools with Gwynn. His sister went to Wildings and he says it would be great for me. If they had a football team, it wouldn’t be so bad, but it’s all so girly-girly with horses and ballet dancing and everything, yuk! I don’t want to go to the school in Llandyward either. It still feels like Gwynn and Mum just want me to go to boarding school because of the new baby. Miss my pals like crazy, miss London and my old school. If my friends were here, boarding school would actually be fun. Being the new girl at school without any friends will be horrible. 😞 And it’s all Gwynn’s fault! The village where we live now is the worst. 20 minutes to the nearest supermarket. If there was a shopping centre, I could at least go shopping. But there’s nothing, no shops, no cinema, no nothing … only sheep!
My room is really nice and big though and we have a fab garden which is great for playing football. If I made some friends in the village, we could have a great time there. I met Gruffudd, the boy from next door, this afternoon. He seems nice. He started talking to me in Welsh and I couldn’t understand ANYTHING. He then spoke English and told me he plays rugby. Well, it’s not football but I might have to learn to like it. They all love rugby here.
Aargh, if I had some credit on my phone, I could call Caroline. Hope I get some pocket money tomorrow.

1. Gwynn thinks Wildings School would be great for Gillian because

   *it is great*
Welcome to Wales

B1 Gillian’s diary

Read Gillian’s diary entry and complete these sentences.

Friday 23rd September

We’ll drive to the north coast tomorrow and have a look at two boarding schools with Gwynn. His sister went to Wildings and he says it was great for me. If they had a football team, it wouldn’t be so bad, but it’s all so girly-girly with horses and ballet dancing and everything, yuk! I don’t want to go to the school in Llanddewi either. It still feels like Gwynn and Mum just want me to go to boarding school because of the new baby. Miss my pals like crazy, miss London and my old school. If my friends were here, boarding school would actually be fun. Being the new girl at school without any friends will be horrible. And it’s all Gwynn’s fault! The village where we live now is the worst, 20 minutes to the nearest supermarket. If there was a shopping centre, I could at least go shopping. But there’s nothing, no shops, no cinema, no nothing… only sheep!

My room is really nice and big though and we have a fab garden which is great for playing football. If I made some friends in the village, we could have a great time there. I met Gruffudd, the boy from next door, this afternoon. He seems nice. He started talking to me in Welsh and I couldn’t understand

1. Gwynn thinks Wildings School would be great for Gillian because

   it is great
Welcome to Wales

Gillian’s diary
Read Gillian’s diary entry and complete these sentences.

Friday 23rd September
We’ll drive to the north coast tomorrow and have a look at two boarding schools with Gwynn. His sister went to Wildings and he says it would be great for me. If they had a football team it wouldn’t be so bad, but it’s all so girly-girly with horses and ballet dancing and everything, yuk! I don’t want to go to the school in Llandysul either. It still feels like Gwynn and Mum just want me to go to boarding school because of the new baby. Miss my pals like crazy, miss London and my old school. If my friends were here, boarding school would actually be fun. Being the new girl at school without any friends will be horrible. 2. And it’s all Gwynn’s fault! The village where we live now is the worst. 20 minutes to the nearest supermarket. If there was a shopping centre, I could at least go shopping. But there’s nothing, no shops, no cinema, no nothing … only sheep!

My room is really nice and big though and we have a fab garden which is great for playing football. If I made some friends in the village, we could have a great time there. I met Gruffudd, the boy from next door, this afternoon. He seems nice. He started talking to me in Welsh and I couldn’t understand.

1. Gwynn thinks Wildings School would be great for Gillian because

his sister goes there
Welcome to Wales

Gillian’s diary
Read Gillian’s diary entry and complete these sentences.

Friday 25th September
We’ll drive to the north coast tomorrow and have a look at two boarding schools with Gwynn. His sister went to Wildings and he says it would be great for me. If they had a football team, it wouldn’t be so bad, but it’s all so girly-girly with horses and ballet dancing and everything, yuk! I don’t want to go to the school in Llandysul either. It still feels like Gwynn and Mum just want me to go to boarding school because of the new baby. Miss my pals like crazy, miss London and my old school. If my friends were here, boarding school would actually be fun. Being the new girl at school without any friends will be horrible. 😐. And it’s all Gwynn’s fault! The village where we live now is the worst. 20 minutes to the nearest supermarket. If there was a shopping centre, I could at least go shopping. But there’s nothing, no shops, no cinema, no nothing … only sheep!

My room is really nice and big though and we have a fab garden which is great for playing football. If I made some friends in the village, we could have a great time there. I met Gruffudd, the boy from next door, this afternoon. He seems nice. He started talking to me in Welsh and I couldn’t understand ANYTHING. He then spoke English and told me he plays rugby. Well, it’s not football but I might have to learn to like it. They all love rugby here.

Aargh, if I had some credit on my phone, I could call Caroline. Hope I get some pocket money tomorrow.

1. Gwynn thinks Wildings School would be great for Gillian because

his sister went there
What does the FeedBook offer?

- immediate, supportive feedback that guides students towards understanding
- Automatic analysis with AI methods instead of manual coding for each activity or submission.
  - 188 different feedback types to tenses, comparatives, relative & reflexive pronouns, gerunds, passives, conditionals, (in)direct speech.
  - covers all language means of the 7th grade English curriculum
  - Each new task entered by the editor is immediately interactive.

- Is this effective in a real-life school context?
  - First randomized trial (RCT) with Intelligent Language Tutoring System in Germany (Meurers et al. 2019).
  - regular English classes, but FeedBook replaces printed workbook and within-class randomization: children receive specific feedback on different grammar topics
  \[63\% \text{ higher learning gains for specific feedback condition (Cohen’s } d = 0.56)\]
A clear win-win situation

• Students
  + receive individualized support while practicing → 63% learning improvement
  + at their level → automatic internal differentiation
  + regardless of family characteristics → educational equity

• Teachers
  + have a reduced burden to provide written feedback
  + can rely on internally differentiated practice without additional effort
  + can work in class with better-prepared students
  + are better informed about abilities of individuals and class

• Researchers in authentic settings can investigate the effects of
  + different types of feedback, exercise types, learning targets given individual learner differences

• Textbook authors and curricular designers
  + learner & activity analytics enable systematic, empirically-based improvement of materials & curriculum
Learner model: What do I know & what should I work on?

Lernermodell betrachten
Hier werden Statistiken zum Lernverhalten angezeigt. Bitte unten auf eine Kategorie klicken um mehr zu erfahren.

- future tense
- present tense
- past tense
- reported tense
- conditionals
- comparatives
- relatives
- reflexives
- gerunds
- passive
Learner model: How about the past tense?
Learner Model: What should I work on?

- Moving trouble
- Presenting facts
- No party for Fay
- An Instagram Star quits

Themes:
- Theme 1 AP 18b
- Theme 3 AP 11
- Theme 4 AP 8
- Theme 4 AP 35
Learner Model: What are my most common errors?

- With conditional clauses (type 2), we use the simple past in the if-clause, not the simple present.: 10
Activity model identifies typical student misconceptions

This is not what I am expecting - please try again.: 13.33%

We are talking about something that was happening in the past at the same time as something else. An expression like 'when' shows that this was happening for a longer time, so we use the past progressive.: 10.4%

An expression like 'yet' tells you that something started in the past but is still important at the time of speaking. It is a signal word for the present perfect.: 9.39%

Present progressive = form of 'be' + -ing.: 2.57%
Activity model: Is this activity effective for learning?

C3 What was ... doing while Gillian was doing something else?

Write down what Gillian's friends were doing while she was running away from home. Use the past progressive in both parts of the sentence.

- L1F1Re: Past progressive

1. buy Arsenal tickets/sit on the bus
   Charlie was buying Arsenal tickets while Gillian was sitting on the bus.

2. feed Patch/sit on the bus
   George was feeding Patch while Gillian was sitting on the bus.

3. watch TV/sit on the bus

buy Arsenal tickets  feed Patch  watch TV  sit on the bus
Activity model: Yes, this activity is effective for this population
Integration of individual practice & teacher-orchestrated task-based class?

- Organize exercises so they empower learners to participate in the functional tasks.
  - improves acceptance of practice as pre-task activities in a task-based curriculum
  - fosters intrinsic motivation of students

- RCT with 847 students: higher learning gains for task-based dashboard (Parrisius et al. in prep).
Task-oriented vocabulary practice (Santhi Ponnusamy & Meurers 2021)

• How can we support learners in reading any texts they are interested in?

• To read and understand a text, about 98% of words must be known.
  - Special editions of texts for foreign language learners are lexically annotated.

• Treat vocabulary learning like a pre-task activity for the task of reading a book.

• Goal: systematically introduce learners to the lexical material they need
  - automatically derive the structured, semantically organized vocabulary space to organize learning efficiently
  - support individual learner models, with preactivation using proficiency level
  - contextualize lexical learning using sentences from the book of interest
Generating the lexical graph for a book

- Given a book, the graph is automatically derived from the semantic vector representation (GloVE) of the word families.
Learning activity generation

- Vocabulary practice and testing uses generated multi-gap activities (Zesch & Melamud 2014).
  - Sentences taken from book, ranked using GDEX (Kilgarriff et al. 2008).
  - Distractors automatically selected from graph based on semantic similarity range.

Choose a word which satisfies all the blanks

Robert looked at ned and scowled at his silence.

He leaned back against his cushions and scowled at her, as if challenging her to dispute his version of events.

Aya scowled, wondering what her sister was doing here, why she looked so happy.

FROWNED  STARED  GROWLED  SCOWLED
Recording learning in the learner model

- The learner model is an overlay on the book’s graph representation.

  - When learner completes activities, node activation changes & propagates through graph.
  - Support faster, systematic learning of words relevant for understanding the book.
Key Factors: **Interaction and Output**

- **Interaction** is central for language development (Vygotsky 1986; Lantoff & Appel 1994)
  - Learning results from interacting with a learner in their **Zone of Proximal Development (ZPD)**
  - Partner **scaffolds** learner development.

- **Output** hypothesis (Swain 2005)
  - only language production requires full specification
  - since understanding of input can rely on “good enough” processing
Interaction in dialogue with spoken language: AISLA (Chen et al. 2022)

Welcome to the Aisla restaurant!

I want to practice booking a table.

TA: I want to practice booking a table.

Key Language: Booking a table

1. What can you say on the phone to book a table at a restaurant?
   - I am calling to book a table.
   - I call to book a table.
   - I would like to book a table.
   - Both

2. What expression can you use to make a polite request?
   - Can I book a table for 8pm?
   - Could I book a table for 8pm?
   - Both

3. Which of the following is more polite?
   - I would like to sit inside.

TA: Do you have anything available for tonight?

Yes, we have some tables for 2022-07-15, but only after 7pm.

I want to book a table.

I wants to book a table.

* Possible agreement error – use the base form here.
Summary

- Digital tools can support a range of aspects of Foreign Language Teaching based on mechanisms established by SLA research:
  - input adapted to the learner level supporting input enrichment & enhancement fostering noticing
  - adaptive practice with scaffolding feedback
  - interaction and output

- Such tools require AI methods to
  - analyze and generate language
  - model learners, activities and curricular learning goals

- Integrating such AI-based tools into educational practice can support the empirical evaluation of tools & underlying research in authentic, ecologically valid contexts to
  - effectively support students with scaffolding feedback (Meurers et al. 2019)
  - better inform teachers about the learning progress and reduce their work load
  - improve materials and curricula
  - advance our understanding of second language acquisition
References


Parrisius, C., K. Wendebourg et al. (in prep). Effective features of feedback in an intelligent tutoring system. *Language Learning and Technology*.


