



# FeedBook: A Web-based Workbook for English

From Supporting the Interaction of Students and Teachers to  
Automatic Adaptive Scaffolding for Individual Learners

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## Introduction

- SLA and FLT research has stressed the importance of individualized, immediate feedback for language learning.
- Problem: limited opportunity for individual, immediate feedback
- In the classroom, the teacher is generally the only source of reliable and accurate feedback available to students, but:
  - little time to focus on individual students, and
  - heterogeneity of students is challenging in the classroom
- Outside of class, how can students be supported in a fair way (not relying on parents)?



## Computer-Assisted Language Learning (CALL)

- CALL systems can support practice, but they require hand-coding of all potential responses for which feedback is to be provided.
  - As a result, immediate system feedback generally is only given for restricted form-based exercises and limited to true/false feedback.
  - But teachers may log in to provide feedback after exercise completion.
- Example: *Englishtown* CALL system (EF Education First)
  - It is of particular interest here to showcase the rich, task-based data on language learning that web-based systems can provide.
  - Cambridge University (Dora Alexopoulou) provides the EnglishTown learner & teacher data in EFCamDat Corpus (Geertzen et al. 2013)



## EFCamDat Corpus

- 16 levels covering A1 to C2 in the CEFR
- In EnglishTown each level consist of 8 units with receptive and productive activities; EFCamDat includes the free writing data.
- The second release about to be made available contains
  - 175 thousand learners, who provided
  - 1.18 million scripts, with
  - 787 thousand scripts (= 66.7%) containing teacher corrections
- Supports empirically grounded analyses of development, e.g.
  - relative clauses (Alexopoulou, Geertzen, Korhonen, and Meurers 2015)
  - complexity & task effects (Alexopoulou, Michel, Murakami, and Meurers 2017)
  - ...



# Tutoring Systems

- How can we design CALL systems in a way avoiding massive manual specification and for a broader range of tasks?
  - Intelligent Tutoring Systems (ITS) can help address this issue
    - interactive and adaptive to individual student
    - quite a bit of research (cf., e.g. Heift and Schulze 2007)
    - but virtually absent from real-life formal teaching
- Our goals:
- close gap between ITS research, FLT insights, and real-life classroom
  - address real formal education needs using current NLP technology



## FeedBook: a web-based workbook for English

- Starting point: *Camden Town Gymnasium 3 Workbook*
  - approved for 7th grade English classes in German secondary schools
  - existing workbook, already integrated into real-life formal education
- Our FeedBook system provides a web-based implementation of the traditional print workbook enabling
  - students to complete activities online
  - teachers to give formative and summative feedback
  - was pilot tested in four classes last school year
- New system version about to be released in addition provides
  - immediate scaffolding feedback for individual learners to incrementally guide them towards successful completion and understanding
  - will be used throughout the new school year in eight classes



## Adapting a paper-based workbook

- Goal: Improve the learning experience for the students and support the teachers with minimal overhead.
  - make FeedBook as similar as possible to look and feel of print version
  - ⇒ without training, users familiar with print workbook immediately benefit
- Originally focused on two main activity types:
  - short answers, requiring sentences, usually meaning-oriented
  - fill-in-the-blanks, usually targeting lexical content or form

Given teacher feedback, we are extending coverage to all exercises in the print workbook to offer full replacement.

- Online version adds some functionality:
  - interaction, navigation, user management, ...



## The FeedBook System (Version 1.0)

- Platform-independent web application, designed to run on computers, tablets, and smartphones.
- Common school workflow supported by FeedBook 1.0:
  1. students work on exercises assigned as homework
  2. students submit results to their teacher
  3. teachers correct student answers and return them with feedback
  4. students inspect the teacher's response





# FeedBook - Student Lobby

FeedBook : Camden Town Workbook 3

Start Optionen bjoern (Schüler) Diesterweg westermann

<p>Diverse Britain</p> <p>Theme 5</p>	<p>Zurück nach oben</p>	<p>An email from Holden</p> <p>Thema 5 A, Aufgabe 3</p> <p>S.80</p>	
<p>Exchange partners</p> <p>Thema 5 A, Aufgabe 4</p> <p>S.81</p>	<p>Leon's questions</p> <p>Thema 5 B, Aufgabe 1</p> <p>S.82</p>	<p>Exciting things happening at Brixton Village indoor market</p> <p>Thema 5 B, Aufgabe 5</p> <p>S.85</p>	<p>Adjective or adverb?</p> <p>Thema 5 C, Aufgabe 4</p> <p>S.88</p>
<p>Speaking check: Can you say it in English?</p> <p>Thema 5 CYP, Aufgabe 4</p> <p>S.92</p>	<p>Grammar check: Questions for Leon</p> <p>Thema 5 CYP, Aufgabe 6</p> <p>S.93</p>	<p>Listening: Mrs Khan's family</p> <p>Thema 5 ET, Aufgabe 2</p> <p>S.94</p>	<p>Mediation: Choosing a book</p> <p>Thema 5 ET, Aufgabe 4</p> <p>S.95</p>

Nachrichten (2)



# Meaning-based example: listening comprehension

- Each subtask is displayed on one page.
- Each page contains all relevant information & media.
- Student can save or submit exercise.


FeedBook : Camden Town Workbook 3 Start Optionen Logout bjoern (Schüler) Diesterweg westermann

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**5** Diverse Britain

**B.5** Exciting things happening at Brixton Village indoor market

b) Watch it again and answer the following questions.



▶ 0:54 🔊 🔍 ⏏️ ⬇️

---

1. When does the report take place?
2. What was the situation in the market up to 6 weeks ago?
3. What has happened since?
4. What kind of shops can you find here now? Name 2.
5. What is the man's message to his viewers?

[◀ Vorherige Teilaufgabe](#)

⬇️ Speichern
✉️ An Lehrkraft senden



# Form-based example: fill-in-the-blanks

FeedBook : Camden Town Workbook 3

[Start](#)
[Optionen](#)
[Logout](#)
[Olaf \(Schüler\)](#)

**1** On the move

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**CYP 4** **Grammar check: Running away**

Complete the post on Ally's Internet message board on the topic of running away. Fill in the verbs in the correct tense (simple present, simple past or will future).

---

I'm a bit worried that one of my best friends \_\_\_\_\_ will run \_\_\_\_\_ (1 *run*) away soon.

She \_\_\_\_\_ (2 *feel*) terrible at home because her parents \_\_\_\_\_ (3 *be*) very strict.

Last weekend we \_\_\_\_\_ (4 *want*) to go shopping together and she \_\_\_\_\_ (5 *not be allowed*) to come with us.

↓ Speichern
✉ An Lehrkraft senden



# FeedBook - Teacher Lobby

FeedBook : Camden Town Workbook 3

Start Abgaben Optionen Kordula (Lehrkraft) Diesterweg westermann

Alles ausklappen Alle Schülerabgaben anzeigen

Alle Schüler anzeigen  [Hilfe](#)

Theme 1 On the move

Theme 2 Welcome to Wales

Theme 3 Famous Brits

A3 Doctor Who's worst enemy [S. 44]

**B2 Family histories: The Batsons [S. 46]**

C6 My great-great-great-grandfather Friedrich [S. 53]

Check Your Progress

Extra Training

Theme 4 Keep me posted

1-6 of 6

Schüler	Abgabe	Status	Anm.	Bewertung
Christian	16.02.2017	zu korrigieren	0	✓
Cora	16.02.2017	korrigiert	4	✓
Beate		nicht abgegeben		
Lisa		nicht abgegeben		
Marius		nicht abgegeben		
Fritz		nicht abgegeben		

korrekte Abgaben akzeptieren. Schüler erinnern

- System shows overview of student submissions and indicates tasks to be corrected.
- Teacher selects exercise for correction.



# Correction Interface

- Interface shows:
  - complete exercise
  - student answers
  - target answers
  - correction aids
- Task of the teacher:
  - mark & categorize learner errors
  - give optional comments & rating

FeedBook : Camden Town Workbook 3

Start Abgaben Optionen Detmar (Lehrkraft) Diesterweg westermann

Maxim Hilfe

**3** Famous Brits

**B 2** Family histories: The Batsons

Read this short text about Charlie's family and fill in the right form of the verbs in the simple past or past perfect.

Support:  
Before you start you can underline the signal words for the simple past and past perfect.

Lee Batson, Charlie's grandfather, arrived ✓ (arrive) in London in 1955 from Barbados. After he had found ✓ (find) a job in Notting Hill, his wife followed ✓ (follow) him to England. They both had worked worked (work) very, very hard and by the time Charlie's father was ✓ (be) born, they had bought ✓ (buy) a small terraced house in Notting Hill. They soon had ✓ (have) another child, Rosie. Ron, Charlie's father had grown up grew up (grow up) in a street where there were lots of other children. After he finished had finished (finish) school, he started ✓ (start) to work. A few years later he married ✓ (marry) his girlfriend, Josie.

Tempus; Korrekt: worked ✕

Autokorrektur; Korrekt: grew up ✕

Grammatik; Korrekt: had finished ✕

Rating: ★★★★★ ✕

Globaler Kommentar für Maxim



## Correction Aid: Visual Highlighting

- Student answer is string-matched against target from teacher booklet.
- If match is positive, students answer is marked as correct.
- Diff-like algorithm finds & highlights parts of student answer that differ from target answer.

Mum's boyfriend was coming to meet me so of course I  
get *got* up in a bad mood. But Mum giving  
*gave* me a great big smile. She made ✓ me my  
 favourite pancakes with maple syrup for breakfast but I  
*wasn't* ✓ hungry. She tries *tried* to cheer me up  
 and say *suggested* that we go shopping. That usually



## Annotation by Teachers

- Teacher selects part of the student answer and
- chooses error category describing nature of divergence.
- Optional free-form comment and automatic inclusion of correct solution.

**Fehlerauswahl für " get":**

Sprachlicher Fehler:  
Tempus ▼

ODER

Inhaltliche Aspekte:  
keine Angabe ▼

↔ Markierung anpassen

(Optional) Kommentar:

(Optional) Korrekte Lösung:

✕ Abbr.
✓ Update

Mum's boyfrie

get got up



# Annotation Types in FeedBook

- based on annotations by teachers in a paper-based pilot

Language form errors	Content errors
<ul style="list-style-type: none"> <li>- grammar</li> <li>- spelling</li> <li>- agreement</li> <li>- clause structure</li> <li>- tense</li> <li>- determiner</li> <li>- pronoun</li> <li>- preposition</li> <li>- word choice</li> <li>- missing word</li> <li>- word order</li> <li>- punctuation</li> </ul>	<ul style="list-style-type: none"> <li>- problematic understanding</li> <li>- missing information</li> <li>- wrong information</li> <li>- lack of understanding</li> <li>- extra information</li> <li>- alternate answer</li> </ul>





## Correction Aided by Feedback Memory

- FeedBook remembers and reapplies previously given feedback for a given item.
- “Auto-correct” annotations are added by system for each other divergence.
- Teacher can spell out or modify any annotation.

Lee Batson, Charlie’s grandfather, arrived ✓  
 (arrive) in London in 1955 from Barbados. After he  
had found ✓ (find) a job in Notting Hill, his wife  
had followed *followed* (follow) him to England.  
 They both worked ✓ (work) very, very hard and  
 by the time Charlie’s father had been *was* (be)  
born, they had bought ✓ (buy) a small terraced  
house in Notting Hill. They soon had ✓ (have)  
 another child, Rosie. Ron, Charlie’s father grew up  
 ✓ (grow up) in a street where there were lots of  
 other children. After he had finished ✓ (finish)  
 school, he was starting *started* (start) to work. A  
 few years later he married ✓ (marry) his  
 girlfriend, Josie.

Tempus: Simple  
Past!; Korrekt: followed  
✖ ↗

Tempus: Simple  
Past!; Korrekt: was  
✖ ↗

Autokorrektur;  
Korrekt: started  
✖ ↗



## Correction after Teacher Interaction

- Teacher error annotation visually distinguished
- Stepwise increase of coverage & consistency

Lee Batson, Charlie's grandfather, arrived ✓  
 (arrive) in London in 1955 from Barbados. After he  
had found ✓ (find) a job in Notting Hill, his wife  
had followed *followed* (follow) him to England.  
 They both worked ✓ (work) very, very hard and  
 by the time Charlie's father had been *was* (be)  
born, they had bought ✓ (buy) a small terraced  
house in Notting Hill. They soon had ✓ (have)  
 another child, Rosie. Ron, Charlie's father grew up  
 ✓ (grow up) in a street where there were lots of  
 other children. After he had finished ✓ (finish)  
 school, he has started *started* (start) to work. A  
 few years later he married ✓ (marry) his  
 girlfriend, Josie.

Tempus: Simple Past!; Korrekt: followed

Tempus: Simple Past!; Korrekt: was

Tempus: Simple Past!; Korrekt: started



# Result Interface for Students

FeedBook : Camden Town Workbook 3 Start Optionen Logout Lars (Schüler) Dieserweg westermann


[Hilfe](#)

**1** On the move

**B 2** Gillian's point of view

Complete this version of the story from Gillian's point of view. Use the following verbs and put them in the simple past.

*begin · come · feel · get · give · go · lie · make · not be · not listen · put · say · sit · suggest · try*



Support:  
Irregular verbs:  
Textbook p. 255

Mum's boyfriend was coming to meet me so of course I got up in a bad mood. But Mum gave me a great big smile. She made me my favourite pancakes with maple syrup for breakfast but I wasn't hungry. She wanted to cheer me up and said that we go shopping. That usually puts me in a good mood but not today. So I said something about homework and stormed into my room. I laid down on my bed and felt really sorry for myself. Just then Mum came in. She sat down on my bed and put her arms around me. She wanted to talk about Gwynn but I refused.

Bewertung durch Lehrkraft: ★★★★★☆

Kommentar: okay

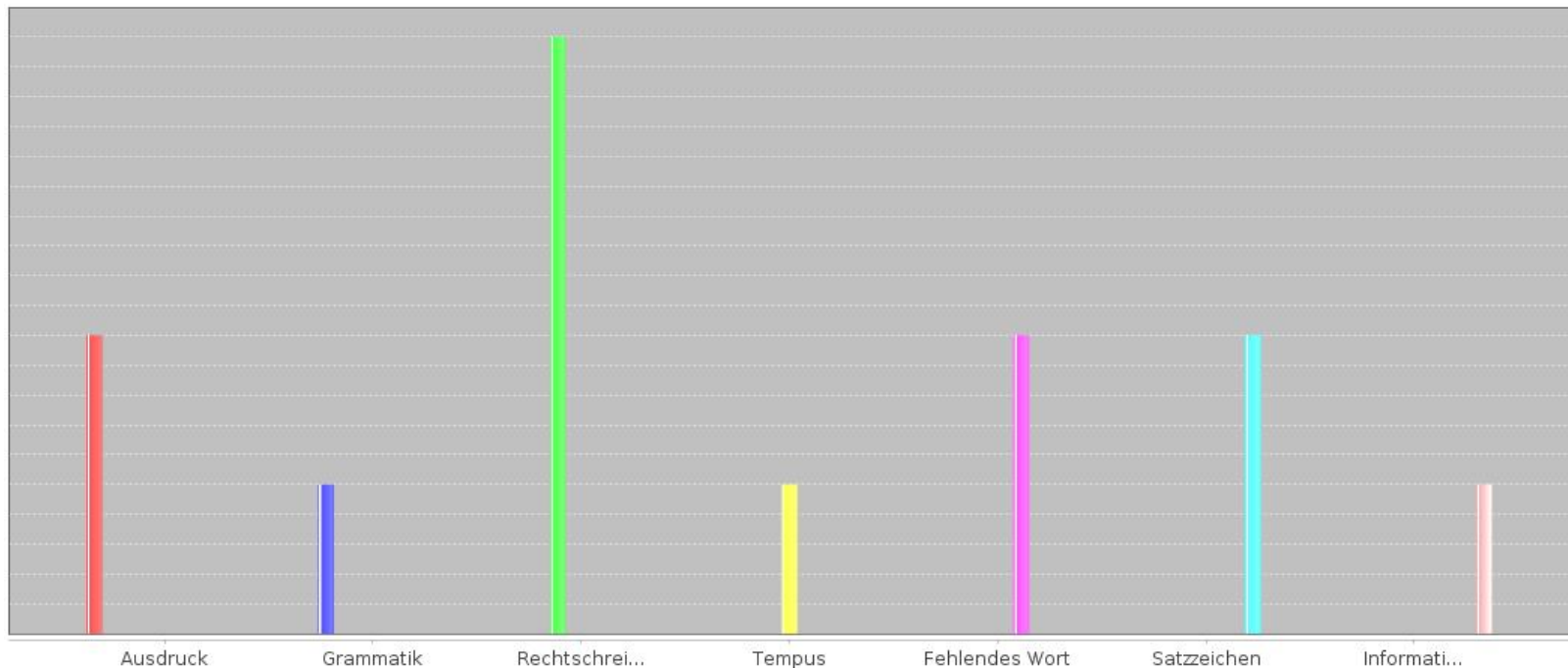
Feedback buttons:  
Wortfehler; Korrekt: tried  
Ausdruck; Korrekt: suggested  
Autokorrektur; Korrekt: went  
Autokorrektur; Korrekt: lay  
Verstehen problematisch; Korrekt: began  
Autokorrektur; Korrekt: didn't listen



## Diagnostics Interface for Teachers

- Teachers can group and visualize errors, e.g., by task
  - specific problems can then be targeted in class

**Fehlerverteilung für Aufgabe Thema 1 C, Aufgabe 2**





## Insights from our interaction with teachers

- Grading exams is already a massive time commitment, so homeworks normally are only discussed as a group in class
- Opportunity to provide individual feedback without additional work (feedback memory, automatic feedback) greatly appreciated
  - Teachers then hope to use class time for communicative/task-based activities with students on a more similar level of ability.
  - But note: freeing teachers from discussing homework in class also a potential threat for those uncomfortable in more communicative classroom
- Use of already established workbook very much appreciated
  - preference for not having to switch between web and paper
- Seeing who did the homework and who didn't is what counts – not fancy ideas about tracking individual learning, etc.



## Insights from our interaction with teachers (cont.)

- The fact that students are connected via WhatsApp and similar services means they may quickly share solutions.
  - We are adding functionality to let a teacher inspect the interaction history of each student, i.e., how quickly did they get it right?
  - Individualizing exercise assignment based on the learner models can provide a general, pedagogically meaningful solution.
- Workbooks are seen as most important in the first three or four years of learning a language.
  - NLP can focus on meaning- and form-based exercises for which the exercise contains enough information to specify target answers.
  - A broad range of tasks can be designed to constrain the well-formed & ill-formed variability of potential learner answers (Quixal and Meurers 2016).



## Issues involving parents

- The different amount of homework support children get from parents at home is a source of significant social injustice, which the FeedBook can help overcome.
- But some parents are also concerned since they feel
  - hand-writing is important, so homeworks should be written by hand
  - children should spend less time with digital devices
  - they cannot or do not want to provide internet at home



## The FeedBook System (Version 2.0)

- Second version of FeedBook extends approach
  1. students work on exercises assigned as homework, receiving immediate, scaffolding feedback incrementally leading student to successful completion of exercise
  2. students submit (usually correct) final result to their teacher
  3. teachers can see result and can optionally provide further feedback, inspection of interaction history is planned,
  4. teacher will be able to view aggregates of student performance, e.g., typical problems





# Examples: Irregular verbs

## B2 Gillian's point of view

Complete this version of the story from Gillian's point of view. Use the following verbs and put them in the simple past.

- LiF1Rc: Simple past

*begin · come · feel · get · give · go · lie · make · not be · not listen · put · say · sit · suggest · try*



Support ●●●●●  
Irregular verbs:  
Textbook p. 255  
●●●●●●●●●

Mum's boyfriend was coming to meet me so of  
But Mum gived ✘ ⓘ ⓘ me a great big smile.  
with maple syrup for breakfast but I \_\_\_\_\_  
me up and \_\_\_\_\_ ⓘ that we go s  
mood but not today. So I \_\_\_\_\_ ⓘ something  
room. I \_\_\_\_\_ ⓘ down on my bed and \_\_\_\_\_

**Feedback für "gived"**

This is not a correct form of the simple past.  
In the list of irregular verbs, the simple past is  
the second form.

<input type="button" value="Bitte genauer!"/>	<p>Feedback hilfreich ?</p> <input type="button" value="Ja"/> <input type="button" value="Nein"/>
<input type="button" value="✓ OK"/>	



## Examples: Subregularities

Mum's boyfriend was coming to meet me so of course I got ✓ ⓘ up in a bad mood.

But Mum gave ✓ ⓘ me a great big smile. She made ✓ ⓘ me my favourite

pancakes with maple syrup for breakfast but I wasn't ✓ ⓘ hungry. She

tryed ✗ ⓘ ⓘ to cheer me up and

ⓘ ⓘ that we go shopping. That

usually puts m

ⓘ something about

homework an

on my bed and \_\_\_\_\_ ⓘ

really sorry fo

\_\_\_\_\_ ⓘ down on my bed

and \_\_\_\_\_

k about Gwynn but I

Feedback für "tryed"

When an infinitive ends in 'consonant + y', we change the 'y' to 'i' in the simple past.

🔍 Bitte genauer!

Feedback hilfreich ?

Ja
Nein

✓ OK



## Examples: Tenses

### CYP 4 Grammar check: Running away

Complete the post on Ally's Internet message board on the topic of running away. Fill in the verbs in the correct tense (simple present, simple past or will future).

I'm a bit worried that one of my best friends will run ✓ ⓘ (1 run) away soon.

She will feel ✗ ⓘ ⓘ (2 feel) terrible at home because her parents are ✓ ⓘ (3 be)

very strict.

Last weekend we

er and she

h us.

Feedback für "will feel"

This is the will future. You need to use the simple present here.

🔍 Bitte genauer!	Feedback hilfreich ?
	<input type="radio"/> Ja <input type="radio"/> Nein
✓ OK	



# Examples: Conditionals

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 Mrs Collins listened more to Gillian, she will not feel bad.* ✖ ⓘ ?

2. Gwynn is very disappointed. Gillian doesn't l

3. George and Rajiv feel bad because they don't

4. Gruffudd's mum won't let him watch rugby b

5. Gillian can't afford to call Caroline because s

Feedback für "If Mrs Collins listened more to Gillian, she will not feel bad."

With conditional clauses (type 2), we use 'would' + infinitive in the main clause, not the will-future.

🔍 Bitte genauer!

Feedback hilfreich ?

Ja

Nein

✓ OK



## Examples: Comparatives

William: Well, my partner must be the

one! She's got long

(fantastic) smile. J

Sam: Wow! You're

Holden: He's the o

William: Shut up, I

(friendly) than you

Nigel: You're right! But have a look at my partner here: he looks really unfriendly in his

picture, don't you think? I hope he's more nicer ✘ ⓘ ⓘ (nice) than he looks or the next

two weeks could be the \_\_\_\_\_ ⓘ (bad) weeks of my life.

Feedback für "more nicer"

When an adverb is very short (one syllable) or has two syllables and ends in -y, we use only -er/-est for comparisons.

🔍 Bitte genauer!	Feedback hilfreich ? Ja    Nein
✓ OK	

ⓘ (attractive)





## Summary

- The FeedBook system provides
  - an opportunity for students to individually practice using online exercises at any time.
  - automatic error annotation assistance and a feedback memory to facilitate the work of the teacher.
  - relieves teachers from the repetitive work of providing feedback on the same issues over and over again,
  - while at the same time allowing them to view aggregates of student performance
- First version of FeedBook used in pilot classrooms since October 2016, positive feedback from teachers and students
- Second version with automatic feedback while students work on exercise about to be released.



## Next Steps

- Evaluate and extend immediate, automatic feedback
    - diagnosis component
    - feedback, with more and different scaffolding steps depending on learner model
  - Evaluate impact of FeedBook on learning outcomes
    - Randomized controlled field study integrating measures of the process and product of learning
    - Compare web-based workbook with automated feedback to a version only transmitting teacher feedback to students
    - Include web-based measures of individual differences (procedural memory, working memory capacity, MLAT-V, . . . )
- intervention study during entire school year 2018/2019



# Questions?

You can also contact us at

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or visit our website:

`http://feedback.website`





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