

Why Will Technology Enhanced Language Learning be Essential for Pupils?

Markus Ebner, Martin Ebner and Konstanze Edtstadler

Abstract—The availability of personal digital devices in schools and at home are offering new ways of engaging students in the area of language learning. In this publication, we present a new approach on writing and blogging for children aged 8 to 12 years, which is especially helpful for those who struggle with the acquisition of German orthography. On a web-based platform the pupils can write essays and blog them later on. Combined with learning analytics methods we offer individualized feedback during the process of writing and a training database with appropriate exercises to support the students' autonomous learning.

Index Terms—educational media, German spelling acquisition, learning analytics, technology enhanced language learning

I. INTRODUCTION

LEARNING ANALYTICS (LA) has gained more and more recognition and importance since it was first mentioned in the Horizon Report 2012 as a forthcoming trend [1]. Long and Siemens also referred to Big Data and Analytics as the most important influencing factors for the future of (high) school education [2]. LA itself benefits from the ability to collect a variety of different data from each user [3] in order to examine the learning activity and the learning behavior more closely. The combination of Technology Enhanced Language Learning (TELL) with LA makes it possible to better understand the language learning itself [4] and to automatically identify and classify learners according to their skills and competences in order to better support them [5] in language learning. In our approach we strongly focus on TELL and LA in the field of German orthography to provide students and teachers with relevant data, which reflect the learning behavior of each

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Markus Ebner is with the department Educational Technology at Graz University of Technology, 8010 Graz, Austria (corresponding author, phone: +43 316 873 8567; e-mail: markus.ebner@tugraz.at).

Martin Ebner is head of Educational Technology department and senior researcher at the Institute of Interactive Systems and Data Science at Graz University of Technology, 8010 Graz, Austria (e-mail: martin.ebner@tugraz.at).

Konstanze Edtstadler is with the Institute of Professionalization in Early Childhood and Primary Teacher Education at the University College of Teacher Education Styria, 8010 Graz, Austria (email: konstanze.edtstadler@phst.at)

individual learner, thus enabling individualized and personalized support [6] with appropriate exercises [7].

II. LANGUAGE LEARNING IN ELEMENTARY SCHOOLS

A. Overview

In this publication we want to present an ongoing research work in the area of TELL and LA. Nowadays, the availability of personal digital devices in the schools and classrooms offers new ways of engaging students, also supported by the broad availability of smartphones and tablets to use internet based applications [8], [9]. This allows us to discover new ways of learning for children in the research fields of mobile learning (ML), LA and TELL. With the IDeRBlog project we try to combine the acquisition of German orthography with text writing, especially blogging, by the use of modern digital instruments [10]. The current development is unique in the field of literacy acquisition. Until now, fundamental requirements for acquiring German orthography (cf. [10]) could only be fulfilled by a highly professional face-to-face training. Especially giving more specific feedback than to look up a word in a dictionary for correcting misspelled words was only possible in an individual setting. The current development facilitates the implementation of an individual approach. So the main research question addresses the idea, how to design an information system for pupils, in order to assist them to improve their spelling ability combined with writing (publishable) texts.

B. Background

Writing, besides reading and calculating, is one of the basic skills pupils have to acquire in (elementary) school. It is indispensable for the future participation in social life and society. Especially, in the German speaking areas of Europe, correct spelling is considered prestigious [11]. Therefore, it is of great interest for teachers to identify shortcomings in the area of orthography at an early stage in order to take appropriate measures to eliminate them [12].

Our approach offers the pupils a web-based platform where they can write short texts in form of blog entries. In contrast to hand-written essays, these texts can be analyzed semi-automatically. In the first step, feedback is provided for correcting spelling mistakes. In contrast to an usual auto-correction system these feedbacks do not simply offer the correctly spelled words but strategy based hints for correcting them in order to improve the child's self-correction and orthographic competence [10]. This is the unique feature of the system as it takes in account several aspects of research in the field of German orthography and its acquisition. The teachers

benefit from the initial evaluation of the text as it provides a qualitative analysis of the spelling mistakes in order to gain insight into the problematic orthographic areas of each pupil. For this purpose, the misspelled words are categorized and assigned to specific phenomena by the intelligent dictionary [10], [13], [7].

This evaluation makes it possible for the teachers to take appropriate measures for supporting each single child, such as explanations and appropriate individual online exercises as well as worksheets, which are also offered on the platform [10]. Furthermore, the progress of the child can be monitored over a longer period of time and made available to the pupils, parents and teachers. This makes it possible to address the child in a more individual way. Subsequently, the analysis of the data allows a better understanding of the spelling acquisition process and allows new didactic approaches [14].

C. Approach

In order to set up the platform we had to fulfill different criteria for our stakeholders: students (age 8 to 12 years), teachers, parents and researchers.

First, we had to assure that the platform is easy and simple to use. The presented feedback and the platforms design have to be as simple as possible to avoid confusion and misinterpretation



Fig. 1. Figure creation: first scratches on the left and the final mascots from the website on the right. The different mascots are offering different function for the students (from left to right): writing, exercising, reading [14].

between the various stakeholders [15], [16]. Therefore, we included students from our partner schools as co-designers of the platform, as suggested in NMC Horizon Report [17]. By the aid of a graphic designer we drafted different color schemes and mascots. With this approach we could assure to create a graphically appealing and age appropriate website [18]. After evaluation and rating by the students we developed the favored design further and integrated it in our concept. Fig. 1 shows scratch and final mascots from our website [14].

Second, we didn't want to create a simple spell checker. Therefore, in case of a spelling mistake, we provide hints to the student for correcting the misspelled words (within the so-called "intelligent dictionary"). This aims to encourage the pupils to reflect about the language and become aware of the word structure, which is important for acquiring the orthography [24]. The provided feedback is based on the theory of German orthography and formulated in an understandable way for the target group. As the feedback is strongly connected with the qualitative analysis, its requirements were analyzed and

considered [13]. For constructing the intelligent dictionary important words as well as frequently misspelled words and their word forms are collected [10]. In a next step, their corresponding misspelled word forms are "invented" depending on the - previously defined - fine grained phenomena which are subordinated to the coarse grained categories of the qualitative analysis [10]. This means, that each misspelled word form, that causes a specific feedback for correction, is connected with a

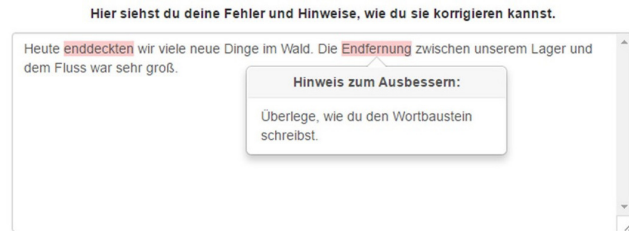


Fig. 2. Example of a text correction [19].

phenomenon - and subsequently with its category - that is representing this type of mistake. The hierarchy of phenomenon and category allows us to stay flexible and to add or delete phenomena evidence-based on the long run. This systematic approach will lead to a deeper and representative understanding of the most problematic areas of German orthography.

Fig. 2 points out an example with hints to correct the misspelled words. The text in English means: „Today we discovered many new things in the woods. The distance between our camp and the river was very far” [19]. The student made two spelling mistakes: *enddeckten* (translated: (we) discovered) with <*end> instead of <ent> and *Endfernung* (translated: (the) distance) with <*End> instead of <Ent>, which are shown to the student with the appropriate hints for correction: “Think about the spelling of the world building brick” [19].

Third, we wanted to provide a suitable training database with exercises for students, teachers, and parents. Therefore, a pool of around 260 online and offline exercises has been created for different error categories [14]. The teachers get a more detailed presentation of the challenging areas from the individual student or the class with more detailed recommendations in correspondence to the categories of the qualitative analysis of the spelling mistakes.

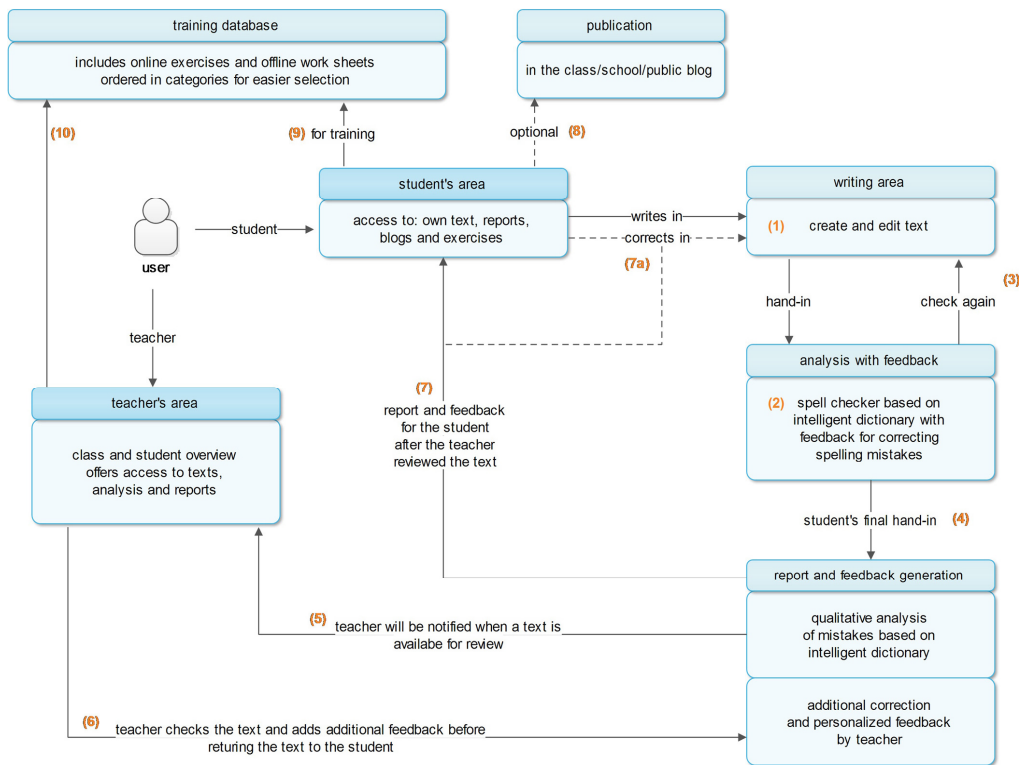


Fig. 4. General workflow for teachers and students [7].

Fig. 3 shows the feedback overview from the perspective of a student. The top 5 error categories are listed and recommendations for exercises (on- or offline) are offered. Additionally, the student should take the interactive spelling courses consistent with the spelling problems, which offer an explanation and are also offered for free on the platform.

Fourth, we had to assure that the students will use the platform frequently. Therefore, we decided to include a blog system in it to “provide relevant reasons and audiences for writing” [20]. Compared to a typical essay writing in a classroom, it can be expected that the motivation to formulate and revise a text many times is higher with the opportunity of publishing it in a blog [10].

III. WORKFLOW

Fig. 4 shows the general workflow on the platform for teachers and students. A pupil writes the text in the provided writing area (1). After the orthographic analysis of the submitted text, conducted by the intelligent dictionary (2), proper feedback is provided to the student. Now the student can further correct the text as often as needed (3) or submit the text (4). This intermediate step ensures that the student can correct spelling mistakes independent and self-reflexive [21]. After submission the teacher gets a notification (5) for reviewing the text. The teacher now has the possibility to correct and/or add additional feedback (6) to the text. A report is generated and sent back to the pupil (7). The student’s parents are also able to access the platform in order to supervise the progress and the suggested exercises. The teacher can instruct the student to redo the essay and send it back to her/him with additional hints and comments

beyond orthography (7a). The student can choose to blog the essay in the provided blogs (8). Recommendations for training exercises are provided by the system to the student (9) and the teacher for the student and class (10). [7]

IV. DISCUSSION

This paper presents a new approach on TELL assisted by LA techniques for identifying orthographic areas of interest to work on and the overall progress of the student. A unique feature of this platform is the automatic feedback for the students during text creation, provided by our intelligent dictionary [10], [7].

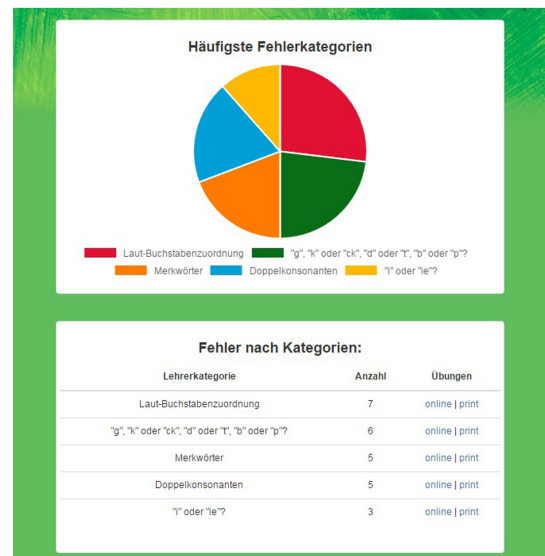


Fig. 3. Individual feedback view with recommendations for training database exercises for students and parents.

The qualitative analysis for teachers supports the selection for proper exercises for the class. Further, the training database provides recommended exercises for teacher-centered and learner-centered learning. In-depth analysis [22] will be conducted to understand the process of spelling acquisition in more detail. The analysis of systematically made mistakes for teachers allows the measurement of the student's individual or class performance, in the long run [23].

It can be summarized that our approach consists of the possibility for pupils to provide a web platform, where they can compose and publish short essays, which are checked against the intelligent dictionary to point out failures in real time. In the background misspellings are tracked and result in an overview diagram to display systematically wrong written words ordered by orthographic categories. This should help pupils to enhance their writing skills through technology in a meaningful manner. As this is the first development in the field of LA and German orthography the currently existing intelligent dictionary can be labeled as a prototype, which works well and has the power to be developed further, especially by integrating much more words and its corresponding mistakes. Feedback and experiences from schools gathered so far show reveal high acceptability. For example, 149 students of our partner schools (grade 3 to 6) submitted between October 2016 and January a total of 429 texts. [7].

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