An Scéalaí: synthetic voices for autonomous learning

Neasa Ní Chiaráin[1] and Ailbhe Ní Chasaide[2]

Abstract. This paper details the motivation for and the main characteristics of *An Scéalaí* ('*The Storyteller*'), an intelligent Computer Assisted Language Learning (iCALL) platform for autonomous learning that integrates the four skills; writing, listening, speaking, and reading. A key feature is the incorporation of speech technology. Speech synthesis provides aural feedback which draws the learners' attention to errors in the text. Natural language prompts focus on common spelling and grammatical errors, further guiding the learners' ability to revise and self-correct written materials. While *An Scéalaí* is still in early stages of development, results of a feasibility study are positive and point towards directions for further development.

Keywords: autonomous learning, speech technology, iCALL platform.

1. Introduction

An Scéalaí ('*The Storyteller*') is an iCALL platform that incorporates speech synthesis and deploys it for autonomous learning, in the sense of directed learning initially leading to self-supported learning (description of current version in Ní Chiaráin & Ní Chasaide, 2018). It entails training in all four language skills, with a particular emphasis on written accuracy, both in terms of the spelling rules of the language and the frequently linked grammatical rules, developing awareness of the morphophonemics of Irish.

The platform (Figure 1) invites the user to contribute regular diary-style entries. The written text is then spoken aloud by the synthesis engine to allow learners to *hear* where there are errors in the text. Subsequently, specific spelling/grammatical errors are highlighted in colour, and the user is encouraged to review and correct

1. Trinity College, Dublin, Ireland; neasa.nichiarain@tcd.ie
2. Trinity College, Dublin, Ireland; anichsid@tcd.ie

their input again. The specific errors targeted for correction will be adapted to the learner and introduced in a stepwise fashion (no more than three errors highlighted at a time in an attempt to avoid cognitive overload). When the diary entry is complete, the user records their own reading of the passage and listens back to compare it to the native models (synthesised).

Figure 1.   Screenshot illustrating *An Scéalaí* main features
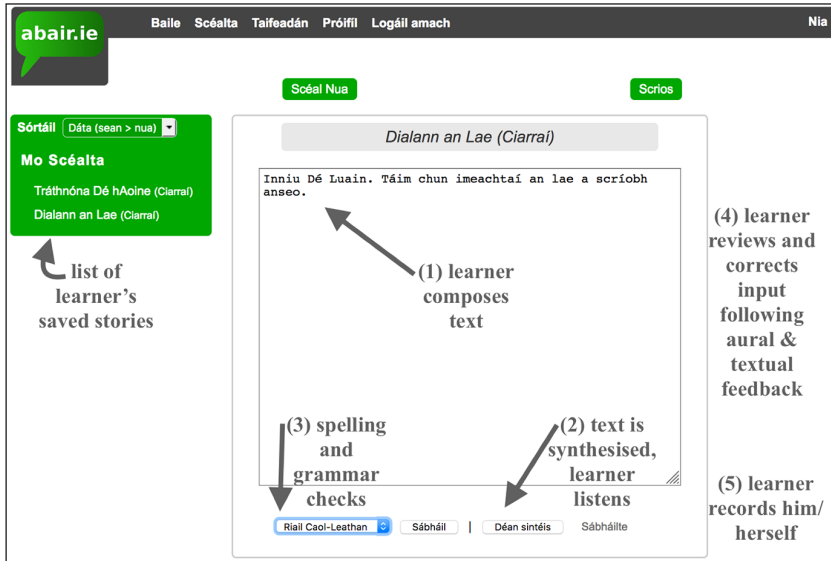
The users' written and spoken input are retained and provide learner corpora, essential for the further development of the system. It is currently undergoing development and is freely available online. It aims not only to provide tools for teachers' own lifelong professional development, but also a tool which they can adapt for use in their classrooms.

This paper aims to discuss the theoretical background of *An Scéalaí* along with findings from a feasibility study of the developing system.

2.   Theoretical background

The current theoretical framework is based on 'experiential' or 'hands-on' learning, where the task is meaningful and students engage in reflective activity, (Dewey, 1997), combined with the sociocultural approach to language teaching and learning

frequently referred to as a communicative approach. A common criticism of the latter approach is that it sometimes fails to bring along those writing skills that create the "all-important interface between explicit processes of language learning and implicit processes of spontaneous language use" (Little, Dam, & Legenhausen, 2017, p. 210). *An Scéalaí* places an initial emphasis on those writing skills and integrates them with the other three language skills.

The *use* of the target language is key to the learning process as learning happens by doing (and by making errors and learning from these). With a view to facilitating autonomy (intentional learning), the present application entails a personalised diary-style writing task (Rosenblatt, 1978). Learners' reflective contributions instantiate meaningful language use, serving as a vehicle for making/correcting written errors in a way that links the written to oral/aural skills.

3.   Language learning goals

Key goals of the platform are that:

- hearing the text spoken (synthetic speech) will increase learners' error detection rate, as errors will simply 'sound wrong';

- the built-in specific error prompts will improve learners' revision of the written text;

- the specific correction prompts linked to the auditory (synthesis) feedback will increase learners' understanding of the connection between pronunciation and Irish spelling rules; and

- the platform will motivate students to spend time on language learning tasks (self-correction).

4.   Feasibility study

A feasibility study was conducted in parallel with the system's development. Five student teachers in the first year of a two-year Master's programme participated. It formed part of an elective taught module on teaching (any subject) through the medium of Irish. The students had all successfully passed the Irish language proficiency test at B2 level (see www.teg.ie). Student intrinsic motivation was high.

Six weeks of diary entries were included as part of the study. Students were awarded 10% of their module marks for contributing diary entries – they were simply asked to contribute *something* each week. One limiting factor was that the participating students were involved in a busy Master's programme with considerable workloads.

5.   Study outcomes

Some objective and some subjective results emerged as presented below.

5.1.   Objective results

Learners produced a considerable amount of written material, clearly warming to the reflective writing task. On average they contributed 567 words weekly, well in excess of what was expected.

The content of the learners' diary entries showed they were engaged and actively reflecting on their language learning journey.

The learners didn't listen and correct as much as would be expected given the volume of written work. This usefully points to the need for a built-in requirement that learners listen back to their written work and correct errors (where they can) before progressing with further writing.

Spelling corrections, which were expected to be easily corrected through listening, were missed by some students who clearly did not 'hear' their mistakes. This highlights a fundamental issue in the teaching of Irish pronunciation. Phonological awareness of the sound contrasts of Irish (very different from English) is often poor, even among teachers, and thus the important underpinning of fundamental spelling rules is missing. This does not, as such, reflect on the present application but rather points to the need for specific resources geared to training the sound contrasts of the language as a precursor to spelling and literacy. A parallel project is currently underway which is geared to this particular problem in Irish language learning (Ó Broin, Barnes, Ní Chiaráin, & Ní Chasaide, forthcoming).

5.2.   Subjective results

Learners reported the experience of using *An Scéalaí* as enjoyable and spent considerable time writing despite a very heavy schedule. Their enthusiasm and level of usage resulted in system glitches being identified and fixed.

The use of synthesis for self-correction was well understood and positively received (*aha moment!*). For some, the linkage between pronunciation and spelling rules was a revelation, glimpsed for the first time. As mentioned, however, this was not true of all students.

Learners enjoyed the autonomous nature of the platform. Frequently commented on was the relative anonymity of an automatic system where learners did not feel judged by their 'teacher'.

Learners agreed they did not spend as much time evaluating, revising, editing their written work as would have been desirable. This may to some extent reflect the time constraints under which students were operating. However, it undoubtedly also reflects a general tendency for students to shy away from revisions and self-correction, something which underlines the need for this type of application.

The unconstrained personal aspect of the writing was positively received compared to the more 'boring' written exercises they are accustomed to.

Student teachers were enthusiastic that the platform would be adaptable to their own classrooms. Specifically mentioned was the fact that the system provides the repetitive corrective feedback that reinforces the teachers' efforts. The fact that this platform helps younger students towards becoming autonomous learners was also positively commented on.

Further comments suggested that the availability of the platform on mobile devices would be desirable leading to increased levels of use (less setup time wastage). An extension of the error correction facilities, preferably with an interactive dimension, was also highlighted.

6.   Conclusions

Current indications are that the platform is going in the right direction to meet its learning objectives, particularly the benefits of using synthetic speech as a mechanism that facilitates integration of oral/aural and writing skills. The study has provided insight into how the next iteration may be adapted, e.g. to ensure that students engage to a greater degree with the correction of their written work.

The spoken and written corpus collected to date is currently being analysed to provide pointers for the steps of corrective feedback to introduce next.

The auditory dimension is undoubtedly helpful for the development of learners' pronunciation, even though it is clear that for some (most learners in all likelihood) specific training in the phonological contrasts of the language will be required – something that is beyond the scope of *An Scéalaí*.

Fuller trials involving student teachers as well as classroom learners will be carried out. Tasks will be adapted as appropriate. Although *An Scéalaí* was specifically developed for Irish language learners, the principles and implementation should be usable for other languages for which high quality speech synthesis is available.

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Future-proof CALL: language learning as exploration and encounters – short papers from EUROCALL 2018
Edited by Peppi Taalas, Juha Jalkanen, Linda Bradley, and Sylvie Thouësny

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