



Animated Storytelling: Student-Created TALES in Irish-Language Learning

SPECIAL COLLECTION:
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ABSTRACT

This article examines how digital and animated storytelling can be employed as an instructional methodology to foster communicative, creative and authentic Irish-language experiences in the primary school classroom. Irish is one of Ireland's two official languages, where Irish is the national minority language and English is the dominant majority language. Students underachieve in Irish compared to other subjects taught at primary level. Poor performance in Irish, particularly in listening and speaking skills, is often attributed to traditional teaching methods and a reduction in Irish-medium teaching, a shortage of language resources, and limited opportunities for using Irish outside the classroom.

This research explores how digital storytelling, animation and coding tools can enhance students' abilities and interest in Irish. The setting for this study is a third-grade classroom in an English-medium primary school over the course of one academic year. It culminates in a practical innovative model called TALES (Technology, Activity, Language Learning, Engagement and Story). TALES integrates all four language skills through the storytelling phase and maps them to four corresponding multimedia skills during the digital recreation phase, developing language and technology skills in the process. TALES externalises student thinking while co-creating shareable learning artefacts, negotiating meaning and deepening learning in the process. It engages students in the meaningful production of the Irish language, and provides them with increased and spontaneous opportunities to speak and write the language through creative writing and digital recreation activities. It supports a curriculum-aligned, student-centred, technology-enhanced, design-based, constructionist and collaborative approach to language learning.

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This study promotes an innovative approach to language learning where students co-create learning artefacts aligned with curricular knowledge in and through the medium of Irish. Blumenfeld et al. define an artefact as a “sharable and critiquable externalization of students’ cognitive work in classrooms” (“*Motivating*” 370). The focus of this study is storytelling in the Irish-language classroom where primary school students engage in design activities creating digital, animated and coded stories using three constructionist technology tools – digital storytelling, animation and coding. Language develops in the social context of discourse where they learn to express and interpret each other’s intentions and meanings (Bruner). They are immersed in the language and inspired to discover it as they need it from resources around them. As students collaboratively construct artefacts, they “visibly display their learning” (Stahl et al. 415) and discuss and reflect upon the concept they are endeavouring to represent (Hoban and Nielsen).

Here, technologies are ideal pedagogical tools for language learning as they support the integration of all four language skills: reading, writing, speaking and listening. Furthermore, having an audience impacts students’ learning by motivating them to be more thoughtful in what they are “doing and learning” (Many and Henderson 346). When they design artefacts for others, their learning deepens (Hoban and Nielsen). They place a higher value on the activity (Knobel and Lankshear) and become more cognisant of their “audience, purpose, and form” (Sylvester and Greenidge 291).

THE IRISH LANGUAGE

Irish is a Celtic language and is one of the oldest spoken literary languages in Europe (Department of Community, Rural and Gaeltacht Affairs) with oral Irish and Irish literature being taught in more than 50 universities worldwide (Fiontar). According to Article 8 of the Irish Constitution, Ireland is a bilingual State in which Irish is the first official national language and English is the second official language (Bunreacht na hÉireann). The Official Languages Act 2003 provides a legislative framework for the provision of public services in Irish (Rialtas na hÉireann) and it has been recognised as an official and working language of the European Union since 2007 (Fiontar). While English is the dominant majority language (RIA), most of the population (89%) is favourably disposed towards the Irish language (Devitt et al.). According to Census 2016, 40% of the population can speak Irish but only 2% speak it daily, leading UNESCO to classify it as a vulnerable language (Department of Community, Rural and Gaeltacht Affairs).

THE IRISH LANGUAGE IN THE EDUCATION SYSTEM

Notably, 13% of the population speak Irish on a daily basis within the education system,¹ reinforcing the important role the education system plays in terms of transmitting Irish from one generation to the next (Harris, “*Late-stage*”). In fact, Irish has been a compulsory subject since the foundation of the State in 1922 (NCCA) when the Irish government first began to pursue a bilingual policy to revive the Irish language (INTO). Additionally, the Education Act 1998 provides official support for Irish through its contribution to the extension of bilingualism in Ireland.

Schools in Ireland are categorised according to their language of instruction: English-medium and Irish-medium schools. Irish primary school students in both English- and Irish-medium schools perform at above average levels in English reading, mathematics and science (OECD). In terms of the Irish language, Irish-medium schools experience higher levels of fluency due to the language immersion process compared to English-medium schools, where students study Irish as a second language (Harris et al.). This study focuses on English-medium primary schools as students in this type of school make less satisfactory progress in Irish. In addition, English-medium primary schools are particularly important to the maintenance and revitalisation effort due to its majority holding of 90% of primary schools, and any successful initiative can therefore affect large numbers of students and thus contribute to the language-revival movement (Ó Duibhir and Cummins).

1 http://www.cso.ie/en/media/csoie/releasespublications/documents/population/2017/7._The_Irish_language.pdf.

The current Irish-language curriculum (Curaclam na Gaeilge) is predicated upon a socio-constructivist learning theory (Ó Duibhir and Cummins). Its main aim is to promote the use of Irish as a natural language (Department of Education and Science). Its approach is a communicative one, where the focus of instruction is on meaning. Oral language development and purposeful language activities are the cornerstones of the curriculum, aligning with language learning objectives of most primary schools in Europe (Edelenbos). Moreover, a new overarching primary language curriculum was recently introduced addressing key literacy skills and strategies in both Irish and English. Its intention is to make the transfer of learning across languages more explicit (Department of Education and Skills, Primary). It is structured in such a way as to provide teachers with clearer statements of learning outcomes and practical supports in terms of students' learning achievements via the Primary Language Toolkit.²

POOR PERFORMANCE IN IRISH

In its national strategy report on improving literacy standards in the Irish primary education system, the Department of Education and Skills notes that “considerable weaknesses have been evident for some time in the teaching of Irish as a second language in schools” compared to English (Literacy 12). Harris et al. report long-term performance in Irish listening, speaking and reading skills of second-, fourth- and sixth-class students in both English- and Irish-medium primary schools between 1985 and 2002. Across two different curricula, audio-visual and communicative, they found a substantial decline in Irish listening and speaking achievements in English-medium schools. Their data also revealed that 21% of parents found their children had problems reading Irish in their final year compared to 8% identifying a problem with their English reading. Furthermore, subject inspectors noted that students were unable to express themselves satisfactorily in nearly half of the lessons they observed and that Irish was being taught through the medium of English in a third of primary classrooms (Department of Community, Rural and Gaeltacht Affairs).

McCoy et al. explored data from the Growing Up in Ireland (GUI) study around teaching and learning in primary schools. The GUI study is a national longitudinal study of 8,568 9-year-old children conducted between 2007 and 2008 (Devitt et al.). It revealed that English-medium primary school students' attitudes were least positive towards Irish compared to English reading and mathematics, with only a fifth of children always liking Irish (McCoy et al.). In fact, 36% of students had a less favourable attitude towards Irish compared to 17% for mathematics and 9% for English (Devitt et al.). Fortunately, the majority of English-medium primary school students are amenable to the Irish language but lack the motivation to engage with it.

FACTORS CONTRIBUTING TO POOR PERFORMANCE

The Department of Education and Skills attributes the problems associated with Irish-language learning to the “implementation of the Irish language curriculum” (Literacy 50). Data from the GUI study suggest that Irish is still being taught in a traditional way (McCoy et al.). Indeed, traditional instruction is still the global dominant approach in most classrooms today (Kozma). This form of instruction involves knowledge transmission (Scardamalia and Bereiter), rote learning (Mattingly et al.), whole-class learning (Knobel and Lankshear), choral recitation (Mascolo) and superficial coverage (Kozma). A student who learns in this way is often unable to apply this knowledge outside of the classroom (Gredler). Harris et al. proffer several other reasons for students' poor performance in Irish, including a reduction of core time spent on Irish as a second language; a reduction in Irish-medium teaching; and unsuitable teaching resources. Finally, few opportunities exist to use Irish authentically outside of the classroom (Devitt et al.).

THEORETICAL FRAMEWORK INFORMING THE EMPIRICAL STUDY

This section briefly describes constructivism as a stepping stone to socio-constructivism and constructionism – two overarching learning theories that frame the language-learning activities deployed in this study. Emanating from these theories are two important learning constructs

2 <https://www.curriculumonline.ie/Primary/Curriculum-Areas/Primary-Language/Primary-Language-Toolkit/>.

central to fostering collaborative learning, namely scaffolding and the Zone of Proximal Development (ZPD). Finally, design-based learning together with constructionist learning approaches facilitate active, technology-enhanced learning in the language classroom.

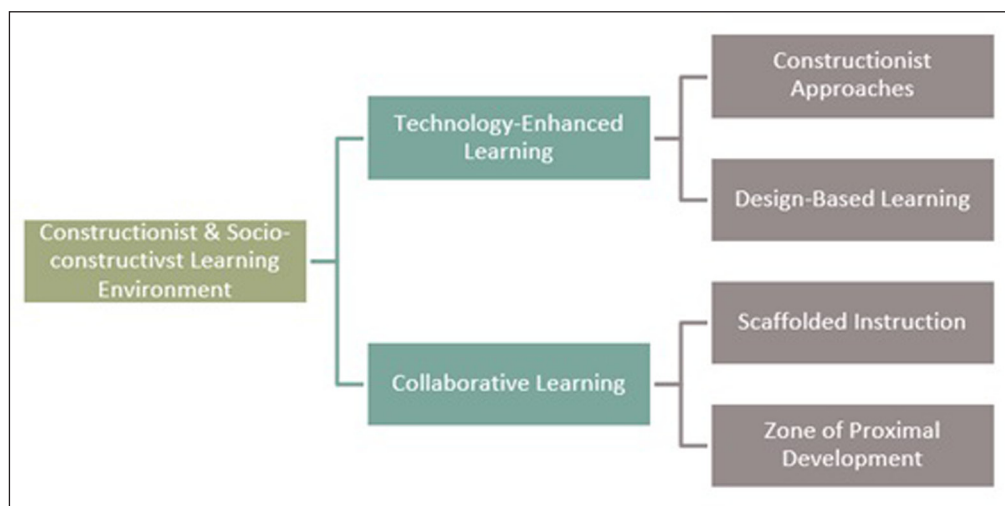


Figure 1 Theoretical Framework Underpinning the Instructional Intervention.

THEORIES OF LEARNING

Constructivists such as Piaget and Vygotsky believe that knowledge “cannot be ‘transmitted’ or ‘conveyed ready made’ to another person” (Papert, *Children’s* 142), but rather students actively build upon and transform knowledge (Gredler). Scardamalia and Bereiter refer to active learning as students engaging in interest-driven activities. While Piaget’s focus was on individual learning and the “relationship between a person and his/her environment” (Gros 328), Vygotsky was more concerned with social learning undergirded by socio-constructivism (Goldman) where learning is meaningful, student-centred and discovery-oriented (Applefield et al.).

Constructionism, first advocated by Papert, bridges socio-constructivist and constructivist viewpoints as it promotes “shared constructive activity in the social setting” (Shaw 179). While constructionism focuses on knowledge construction (Goldman), it is also concerned with making learning constructs more tangible and shareable. Here, the student engages meaningfully with her surrounding environment in “hands-on explorations that fuel the constructive process” (Ackermann 1), where “learning by doing is better than learning by being told” (Bruckman and Resnick 208).

COLLABORATIVE LEARNING

Both constructionism and socio-constructivism foster collaborative pedagogical approaches through the ZPD and scaffolding. Vygotsky states that “what is in the zone of proximal development today will be the actual developmental level tomorrow – that is, what a child can do with assistance today she will be able to do by herself tomorrow” (87). In this way, knowledge is mutually built through interaction with others, where “learners both refine their own meanings and help others find meaning” (Applefield et al. 38). Scaffolding develops the ZPD of each individual student, where the student’s intellectual functions are maturing but have not yet matured, and where the teacher assists the student through questioning and modelling (Gredler). According to Vygotsky, approaches to language learning are “initially socially mediated” and then eventually internalised, becoming “part of the repertoire of the individual” (Langer and Applebee 173). Dialogue promotes “the kinds of opportunities necessary for the teacher to provide scaffolded instruction” (Palincsar 73). This scaffolding process eventually leads the student to carry out a similar task independently without support (Tabak, “Synergy”).

The notion of scaffolding has evolved from Wood et al.’s original metaphor of one-to-one interaction between an expert adult and child to include “more knowledgeable peers” (Stone 344) as well as technological tools, paper-based artefacts and learning activities (Davis and Miyake). Tabak believes that this synergy of scaffolds triangulates each scaffold’s strength and are more powerful to learning together than apart, as they “interact and work in concert to

guide a single performance of a task or goal” (“Synergy” 318). As students learn, they need less support and “scaffolding can be attenuated and ultimately removed” (Mascolo 8). Cazden, who first made this connection between scaffolding and the ZPD explicit, describes this process of fading as a scaffold that “self-destructs gradually as the need lessens” (11).

TECHNOLOGY-ENHANCED LEARNING

The third element in this theoretical framework is technology-enhanced learning. Technology can bring the idea of active learning to life through constructionist tools and design-based learning activities.

Constructionist Learning

Externalising and presenting content through construction deepens learning (Luckin et al.) and enables later reflection (Reiser). Papert uses the metaphor of bricolage for this type of learning, where students construct, fix and improve “mental constructions” (*Children’s* 144). Goldman describes bricolage as the process of tinkering with an object, which has the ability to change the student’s thinking. This playful approach of tinkering, while initially associated with coding, can extend to any technology-enhanced learning environment where students are creators. Koehler et al. note that playful learning is voluntary, intrinsically motivating and “independent of external rewards or incentives” (153). A constructionist teacher will try to give the student the “freedom to demand knowledge when he is most receptive to it” (Gargarian 149). Kafai and Resnick highlight the “strong connection between design and learning” in constructionism (4) through the type of activities that involve “making, building, or programming” in a “learning by mindful doing” way (Quintana et al. 122).

Design-Based Learning

Papert describes design-based learning as the integration of technology with curricular learning (*Children’s*). Students engaging in design activities co-construct knowledge through “exploration, experimentation, discussion, and reflection” (Resnick, “Rethinking” 33). They learn “about design by managing the projects while, through design, they learn about academic subjects” (Kafai 72). Gargarian describes design activities as “mind-stretching” (141) where students adopt the “role of producers rather than consumers” (Kafai 97) and “make things that represent their thinking about complex problems” (Goldman 25). This type of learning encourages conceptual change (Mascolo). Conceptual change is defined as a process where students “build new ideas in the context of old ones; hence, the emphasis on ‘change’ rather than on simple acquisition” (diSessa 265).

Design activities focus on the process of “meaning-construction” which is more important than the product (Kafai and Resnick 4) and “even though students may not achieve a well-rounded final product, learning can take place because of the involvement over time” (Kafai 73). Such activities fall under the “broader rubric of project-based activities” (Mishra and Girod 46) and take the guise of task-based learning in the language classroom where language meaning, understanding and interaction are promoted, as opposed to linguistic structure alone (Richards). Tasks are challenging and authentic, and learning becomes more meaningful for students as they are not learning for the next test (Volman). Design-based learning activities give students an opportunity to bring “their own unique interpretations to subject matter ideas”, as opposed to “conventional schooling, where ideas are impressed rather than expressed” (Mishra and Girod 49).

RESEARCH METHODOLOGY

This study draws on ethnographic approaches, while design-based research (DBR) guided the instructional intervention using mixed methods to gather qualitative and quantitative data from teachers and students. In a DBR study, an instructional intervention generally involves three design cycles or iterations (McKenney and Reeves), where each one informs the subsequent one by remediating any shortcomings observed in the previous one (Bannan). An iteration is characterised by “three interconnected phases of (1) analysis and exploration; (2) design and construction; and (3) evaluation and reflection” (Long and Hall 574). In this study, each iteration reflects students in their current learning state, with each successive iteration manifesting a

transfer of learning in terms of language skills and technical ability. Lobato defines transfer of learning as the “application of knowledge learned in one situation to another situation” (17). An example of a transfer task in this study is the correct use of the preposition “sa” + lenition (h) in iterations two and three after learning this grammatical rule in iteration one. All methods chosen for this study were “fit for the purpose of the research” undertaken (BERA 11) and this was further reinforced by University of Galway granting ethical approval before embarking upon the empirical study.

INSTRUCTIONAL INTERVENTION

This section depicts the instructional intervention undertaken in this study. It summarises the theoretical and design requirements of the learning environment and demonstrates how learning activities were developed to enhance the Irish-language learning experience.

This study took place in the setting of a third-grade classroom composed of 27 students (14 girls and 13 boys aged between 8 and 9 years old) in an English-medium primary school in Ireland over the course of one academic year. Students first created paper-based storyboards during the composition stage and engaged with digital tools to enliven them thereafter. In this way, digital literacies enhanced traditional literacies (Sylvester and Greenidge) and bridged the connection between what students do at home and what they do in the classroom (Fullan). The first iteration entailed an exploratory pilot to gain an understanding of the learning context and to examine the potential of design activities in the classroom. The second iteration involved scaling up to the mainstream cycle, where these design activities were further developed and expanded upon. The third iteration culminated in the capstone cycle and helped to verify the innovation overall.

THEORETICAL REQUIREMENTS

Sandoval posits the notion of conjecture mapping as a means of specifying “theoretically salient features of a learning environment design and mapping out how they are predicted to work together to produce desired outcomes” (19). The specific theoretical conjectures drawn from this study’s theoretical framework and embodied in this language-learning environment include:

- Fostering language-in-use in an integrative, communicative and meaningful way;
- Pedagogical application of technology using constructionist tools and a design-based learning approach, undergirded by the TPACK framework (discussed later); and
- Collaborative learning through instructional and technological scaffolding.

Each conjecture becomes more refined and reified across multiple iterations, thereby validating them in the process, leading to the desired outcome of an enhanced Irish-language learning experience for the student. The conjecture map shown in Figure 2 outlines theoretical conjectures, embodiment, mediating processes and outcomes as a technique to ensure that empirical research was conducted in a systematic way, producing “not only sound instructional designs but trustworthy, usable theories of learning” (Sandoval 33). This alignment between theory and practice enhances validity and rigour in research and evidence of the desired outcomes being achieved.

DESIGN REQUIREMENTS

The design requirements guiding this study are context-specific (McKenney and Reeves) and are drawn from the challenges and potential solutions to Irish-language teaching at primary school level. They include:

- Language requirement – students use the language that they need as they compose their stories and recreate them in digital format by drawing on prior learning and exploring new language.
- Pedagogical requirement – students learn collaboratively in the classroom, clarifying and deepening their understanding of the language. The intervention must support active

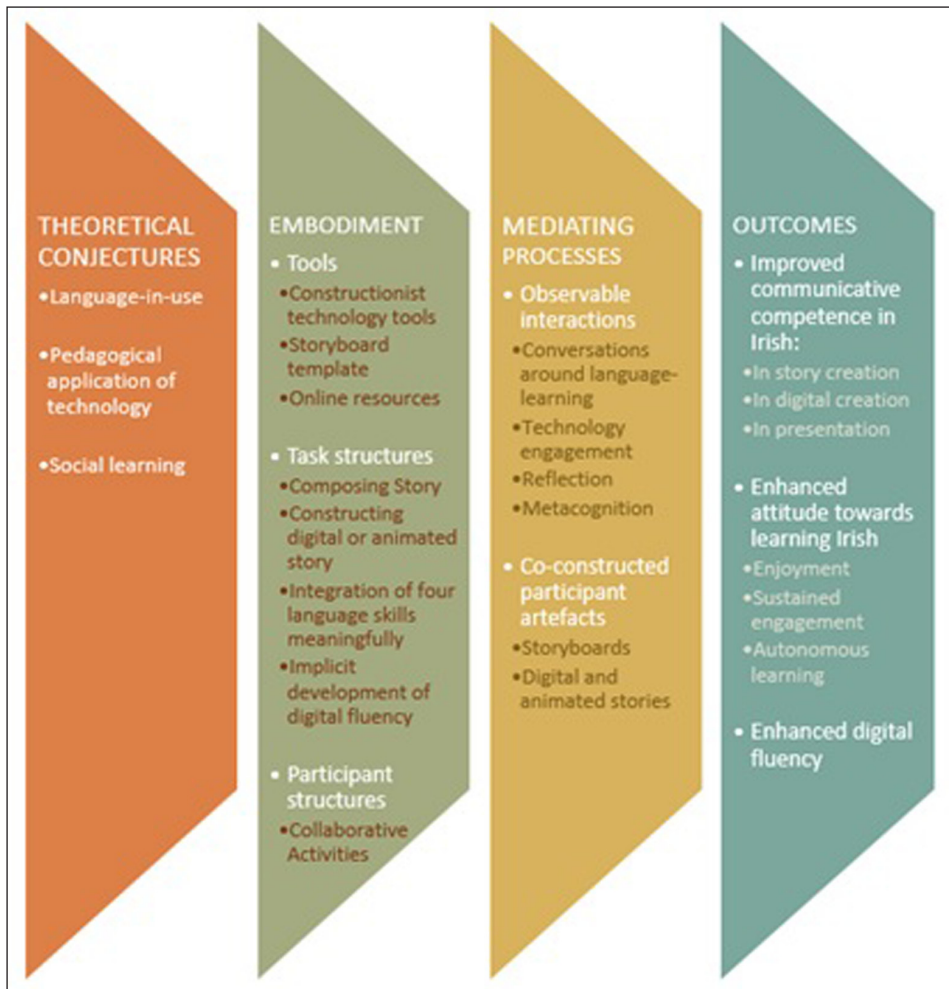


Figure 2 Conjecture Map of Instructional Intervention.

social learning in this way and promote discussion around the target language through the medium of the target language. Activities must align with curriculum.

- Technological requirement – applications must be attractive to the student, easy to learn, accessible, reliable, amenable and inexpensive.

EMBODIMENT OF THE DESIGN

This section describes the design of the instructional intervention, including the learning approach and activities, language content, assessment measures and technology tools. *Tabak* distinguishes between exogenous and endogenous design (“Reconstructing”). The former refers to the instructional strategies, curricular materials and learning tasks that are developed specifically for research. The latter refers to the materials and practices already in place in the local setting. In this study, the exogenous design represents the innovative approach, while the endogenous design represents the traditional approach. The endogenous design is an inevitable component of the innovation and thus an “organic part of the supports for learning” (*Tabak, “Reconstructing” 227*). The combination of exogenous and endogenous design contributed to the success of this innovation.

Learning Approach

The curricular approach was maintained throughout the intervention where a standard Irish lesson entails three phases: the pre-communicative (introduce topic), communicative (develop topic) and post-communicative (summarise topic). Curriculum coverage was a concern for the teacher. She felt under constant pressure to cover it in its entirety. This aspect of endogenous design was maintained by aligning learning activities with the Irish textbook. Each chapter in the textbook aligned with one of the ten themes outlined in the Irish curriculum,³ where each theme is visited twice throughout the academic year.

3 http://www.curriculumonline.ie/getmedia/920c3fd9-1f53-4163-a045-90f07ebb6b71/PSEC01b-Gaeilge_curriculum.pdf.

The tinkering approach is an aspect of exogenous design that was incorporated into this research study. The Four Ps of Creative Learning – **Projects, Peers, Passion and Play** (Resnick, “Give”) guided the implementation of innovative language learning activities in the classroom, where students engaged collaboratively on meaningful tasks in a creative exploratory way. In addition to the Four Ps of Creative Learning, design activities encompassed the four principles for effective collaborative project-based learning in the classroom (Barron et al.). These included 1) challenging and relevant learning tasks, 2) appropriate scaffolds, 3) frequent opportunities for reflection and 4) social participation. Individual accountability was also built into this design where each student had to finish a task (a scene in the story) in order to complete the overall task (the story).

Another aspect of exogenous design is the collaborative approach. Kennedy estimates that a student in a class of fifteen may have “five interactions with the teacher during a 50-minute period” (51). One can assume that this would be halved in a classroom of double that number, which is the typical size of Irish classrooms. Scaffolded instruction through dialogue increased teacher–student interaction in this study. Students were also organised into mixed-ability groupings, where weaker students often benefited and learned from stronger students. In reciprocation, stronger students’ understanding was reinforced and embedded at a deeper level. In this way, students learned collaboratively, clarifying and deepening their understanding of the language, thus meeting the second design requirement. As Blumenfeld et al. found in their study, it took a while for students to adapt to this new approach to learning, as they had to engage and “adjust to new relationships with their teacher [and] with each other inside the classroom” (“Motivation” 478), and for the first time, solely through the medium of Irish.

The synergistic scaffolding approach is the final aspect of exogenous design incorporated into this study. Four scaffolds were employed: 1) the storyboard template, 2) constructionist technology tools, 3) teacher interaction and 4) peer interaction. Teaching was customised around students’ needs through effective instructional and software scaffolding. In designing the ZPD into language learning activities, students were encouraged to tinker and play with technology tools, to explore and ask questions around language, and to seek assistance from their teacher and their peers as well as provide assistance to others. Technology scaffolded the structure of design tasks by guiding and focusing students on the activity (reminding them of pending tasks, for example) and by reducing the degrees of freedom through decomposing tasks into smaller ones (Reiser). Technology also scaffolded the epistemic knowledge of language learning through the process of digital recreation – summoning students to discuss and reflect on language meaning and form.

As students internalised new knowledge in each learning topic, teacher scaffolding for those topics was gradually reduced and eventually removed. The storyboard template and technology tools were central and constant in the language learning environment, however, and guided and structured learning activities to reduce their complexity. Fading occurred in terms of the teacher’s assistance in using these scaffolds, as students became more competent in their use. In terms of other learning resources in the classroom such as dictionaries, textbooks and vocabulary lists, they functioned more as learning tools and not scaffolds in the learning process. They enabled students to take ownership of their learning as they became more independent in their pursuit of knowledge.

Language Content

Emphasis was placed on learning language-in-use (Bruner), promoting an environment that engaged students and motivated them to want to learn in order to compose and share their stories. Stories play an important role in children’s language learning, as they are naturally interested in them and they appeal to their imagination (Edelenbos et al.). In this study, learning activities encouraged students to think and talk about the Irish language, especially in terms of correct sentence structure, grammar and vocabulary. They were encouraged to use the language they already knew and to search for new language they needed while composing their stories, thus meeting the first design requirement.

They created storyboards (a textual and pictorial paper representation), penning scenes and positioning them in coherent sequences. As they completed this activity, they reflected upon language learning concepts and engaged with oral, aural, written and reading skills.

Digital creation provided students with further opportunities to engage and reflect upon their learning. Activities in this study focused on the following four grammatical constructs: 1) an sineadh fada (acute accent); 2) an séimhiú (lenition); 3) an t-urú (eclipsis); and 4) an t-ainm briathartha (verbal noun). All language and computer activities were mediated through Irish and applications were localised to Irish where possible.

Learning Activities

A learning activities' framework developed by Van den Akker guided the design of student learning activities. This addresses ten components concerning student learning, including rationale, learning objectives, content, activity, teacher and researcher roles, location and time, resources, grouping and assessment. Figure 3 outlines the design of Irish-language learning activities in this study.

Learning Activities	
Rationale	<ul style="list-style-type: none"> To improve language ability in Irish To enhance attitude towards the Irish language
Learning Objectives	<ul style="list-style-type: none"> To integrate four language skills in a fun, natural, communicative and authentic way To develop digital fluency and 21st century skills
Content	<ul style="list-style-type: none"> Irish-language constructs (curricular themes and learning objectives encompassed within textbook chapters) Various technology skills in image and audio editing, online searching, digital story creation, animation and coding.
Learning Activities	<ul style="list-style-type: none"> Students learn through storytelling
Teacher Role	<ul style="list-style-type: none"> Traditional Irish lessons involving whole-class instruction Innovative Irish lessons involving short bursts of instruction followed by facilitation of collaborative learning in dyads and triads
Researcher Role	<ul style="list-style-type: none"> Innovative Irish lessons involving short bursts of instruction followed by facilitation of collaborative learning in dyads and triads
Time	<ul style="list-style-type: none"> Students spend four hours a week learning Irish The teacher spends two weeks covering each textbook chapter Each learning activity requires two weeks to complete and involves a combination of traditional and innovative approaches Traditional Approach: <ul style="list-style-type: none"> New topic is introduced (1 hour) The topic is summarised (1 hour) Innovative Approach: <ul style="list-style-type: none"> Students create their storyboards in dyads (2 hours) Students create their digital artefacts in groups of three (2 hours)
Location	<ul style="list-style-type: none"> Classroom – students learn together. There is a buzz of conversation and activity Computer room – students convene in the computer room at the beginning of each iteration and play with the new technologies. Each student sits at a computer tinkering with the tool and learning basic skills. There is a sense of awe and comradery as students experience and share new learning
Materials & Resources	<ul style="list-style-type: none"> Paper-based storyboard templates, pencils and coloured pencils Dictionaries, textbooks and reference lists Clocks Laptops, desktops, earphones and microphones Technology applications such as an image editor, a sound editor, a search engine, a digital storytelling tool, a digital animation tool and a programming tool
Grouping	<ul style="list-style-type: none"> Students work in dyads during the storyboarding activity and in triads during the digital creation process Groups are mixed ability and devised by teacher
Assessment	<ul style="list-style-type: none"> Formative assessment of digital artefacts Formative assessment of conversation during composition and creation (spontaneous discourse unrelated to curricular content was not the focus of this study)

Figure 3 Language Learning Activities Framework.

Pedagogical Integration of Technology

Technology is only “one component in a complex ecology of teaching and learning” (Cummins 8). Knobel and Lankshear note the sometimes ineffective use of technology in the classroom when it is simply “tacked on” to literacy tasks – perpetuating traditional instruction instead of

being pedagogically integrated (55). Adopting Koehler and Mishra's Technological Pedagogical and Content Knowledge (TPACK) framework can mitigate this. TPACK focuses on the three bodies of knowledge required for effective pedagogical practice in a technology-enhanced learning environment. These are knowledge about pedagogy (generic knowledge about teaching and learning), content (subject domain) and technology. A design-based learning approach incorporating constructionist tools, undergirded by TPACK, ensured the pedagogical integration of technology in the language classroom. Software-realised scaffolding reinforced this combined approach to successfully bring about a technology-enhanced language-learning environment.

Furthermore, the instructional intervention started with a relatively simple use of technology in the form of digital stories (Iteration 1), working up to digital animation (Iteration 2) and eventually to computer coding (Iteration 3). This enabled effective integration of technology into classroom pedagogy and a productive pathway to achieve "high-end instructional goals" (Ertmer 33). Each technology pushed the learning curve and brought with it new challenges, thus consistently maintaining student engagement. Students moved seamlessly from simpler applications to more advanced applications during the course of the year, as each iteration provided them with the skills to do so, indicating learning transfer. Short instruction bursts of five minutes' duration were built into innovative activities, where the learning objective was explained and the key tools and steps in story creation were modelled. Students' initial interest and excitement were buoyed through periods of free play. Armed with the basic skills, they explored and played freely with each application before creating their stories in earnest. Such free play enabled students to experiment and discover functionality in a fun way, while growing in confidence and skill. They also shared what they learned with each other, deepening their understanding of the tools.

Technology Tools Employed in this Study

Most technologies are "not designed for educational purposes" (Koehler et al. 147). Nonetheless, technologies are malleable and teachers can adapt and repurpose them to achieve their pedagogical goals (Gillen and Barton). This creative repurposing of technology is known as melioration (Koehler et al.). For this study, it was important to select multimedia technology tools that were usable, appropriate for the student, open source where possible and either free or relatively inexpensive. Gilbert defines these kinds of technologies as Low Threshold Applications as they are low in cost, easy to learn, accessible, reliable and amenable. The STORIES framework was developed specifically for this study and outlines the criteria for technology tools appropriate for digital and animated storytelling in the classroom, thus meeting the third design requirement. STORIES is an acronym for:

- **S**tudent email addresses are not required
- **T**ext capability
- **O**nline application
- Voice **R**ecording feature
- **I**mage design/editing/importing feature
- **E**ducational/Free licence
- **S**tretchable functionality

Figure 4 shows a Symbaloo⁴ (an online visual resource management tool) of qualifying applications. This collection includes applications that are either free to use or available to purchase at a heavily discounted educational price. Applications are organised into categories and each category is colour-coded to indicate its function.

Three key technology applications were chosen based on this STORIES framework and incorporated into the language learning activities. These were:

4 <https://www.symbaloo.com/mix/stories-technology-tools>.



Figure 4 Symboloo of Technology Tools.

1. Little Bird Tales⁵ (LBT) – a simple digital storytelling application that required minimum instruction to use effectively. It provided a good platform to introduce concepts such as story structure, design and online searching. It had a ceiling, however, in that it was limited in its functionality.
2. Go Animate for Schools⁶ (GA) – a digital animation application that was more advanced and had no ceiling where students could manipulate its functionality to create animations in new ways.
3. Scratch⁷ – a programming application used to create digital animations. This too had no ceiling and students were only bound by their imaginations.

Little Bird Tales and Scratch were developed with the needs of students in mind. Go Animate for Schools, however, is an example of a learner-adapted artefact, as it is a simplified version of a more powerful and professional application called Go Animate.

The STORIES framework also guided the selection of other multimedia and search tools employed in this study. Students were introduced to a dedicated clipart website called My Cute Graphics (MCG).⁸ They could search for clipart using the image categories, diminishing the need to use English in their searches. They used an audio recording web application called Vocaroo⁹ and a paint studio called ABCyapaint¹⁰ – a more advanced online audio editor and design studio compared to those built into LBT, GA and Scratch. Students also used an online search engine called DuckDuckGo.¹¹ Unlike Google, this site protects a user’s privacy by not personalising their search results or profiling its users. It was also possible to localise this website to Irish and to switch off all advertising. This made it child-friendly and more conducive to Irish-language learning.

Assessment

Formative assessment of individual student learning in this study was process-oriented and supported through observations and scaffolding opportunities as they created their stories. Students also engaged in self-assessment as they drafted, revised, edited, created,

5 <https://littlebirdtales.com/>.

6 <https://goanimate.com/>.

7 <https://scratch.mit.edu/>.

8 www.mycutegraphics.com.

9 www.vocaroo.com.

10 http://www.abcya.com/abcya_paint.htm.

11 www.duckduckgo.com.

reflected upon and shared their stories. They also engaged in peer-assessment when they reviewed and corrected each other's stories. Students' learning artefacts were also assessed summatively using a rubric designed specifically for this study. It included eight criteria and a four-point scale ranging from 1 (poor) to 4 (high). The criteria of achievement encompassed storyboarding, story development, content and theme, voiceover, text, media, design and audio. The online Roobrix¹² tool was used to score the digital storytelling rubrics.

SUMMARY OF THREE ITERATIONS

In this section, each of the three iterations is summarised – pilot, mainstream and capstone, paying particular attention to conflicts arising in student learning and the resolutions designed and enacted in the classroom in response to these.

ITERATION ONE – DIGITAL STORYTELLING

Digital storytelling integrated language skills with corresponding multimedia skills around curricular content. Students' digital stories demonstrated semantic, morphological and syntactical use of the Irish language in appropriate and meaningful ways. A successful digital story is defined as one that is constructed upon a solid storyline, encompassing six scenes that are logically linked. It incorporates voice, text and still images, as well as appropriate backgrounds, character images and audio effects to reveal context and enhance meaning.

Students created 18 digital stories in class over a period of six weeks, where they embarked on a new curricular theme (depicted in three chapters) every two weeks. While they were slow to speak in Irish, they found writing their own stories to be motivating and fun, with one student saying: "it is more interesting than the book and you get happy when you do it". Several students mentioned learning more Irish than usual: "It is easier to do sentences and all that because you learn more Irish" and "I'm learning how to say sentences in Irish! It is fun too" and "I love Irish now!" Interestingly, they were never asked to include closing credits at the end of their stories, but many of them did, indicating ownership of learning and pride in their work. Surprisingly, students created a further 55 digital stories outside of school, revealing their level of engagement with both the technology and the storytelling approach. Only 9% (n = 5) of those created at home were in Irish, however.

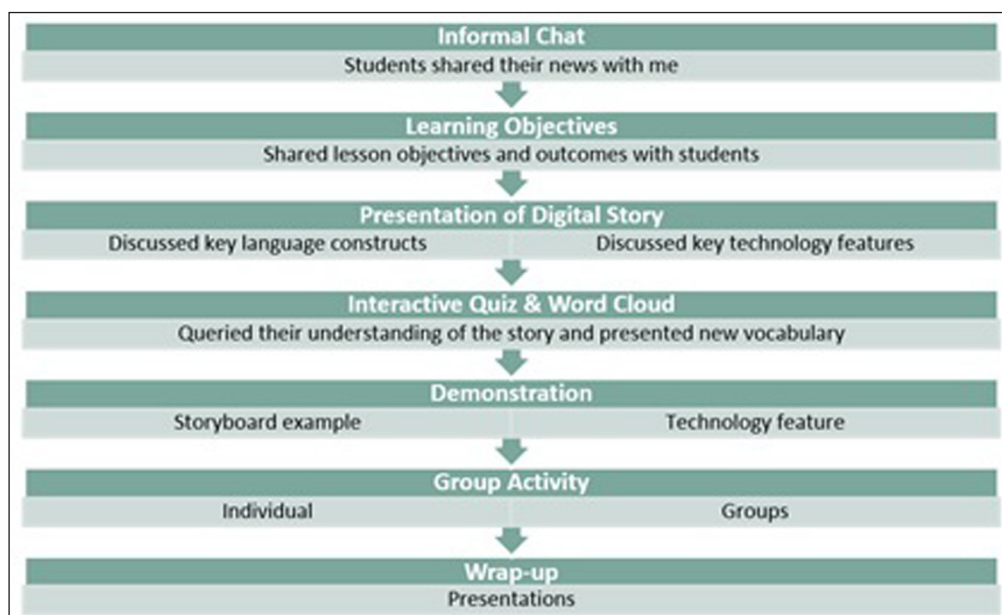


Figure 5 Innovative Irish Lesson Structure (Iteration One).

12 <http://roobrix.com/>.



Figure 6 Student Storyboard.

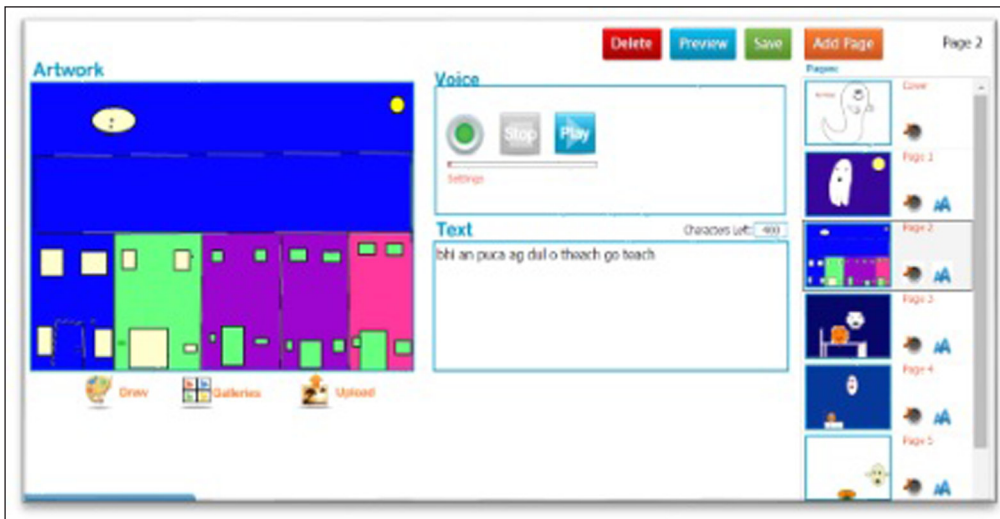


Figure 7 Digital Story in Little Bird Tales.

Modifications Informing Iteration Two

Due to a reliance on translation as an instructional method, a more immersive approach was adopted in the second iteration. English/Irish dictionaries were also introduced, giving students more ownership of their learning. This was further reinforced by having students present their own digital stories to the class rather than their teacher. The storyboard activity changed from an individual to a paired activity to encourage dialogue and negotiation. The number of scenes in the storyboard template was reduced from six to four to help students focus more on language content. They were encouraged to leave their artwork until the end as well. Students corrected each other's storyboards as a way to learn from each other, which served as an added incentive to be more mindful in their writing.

Students became so engaged in their story writing and digital creations that they often lost track of time. Each group was given a miniature clock to help with time management. They found URLs difficult to input at times so they were encouraged to search for the applications using the search engine DuckDuckGo. This also ensured greater success in finding them at home. Because surrounding noise from neighbouring groups interfered with audio recordings, headphones with microphones were provided. They were also encouraged to troubleshoot technical issues as they arose in class rather than rely on the teacher to resolve them.

ITERATION TWO – ANIMATED STORYTELLING

Digital animation was introduced to maintain student engagement in language learning and to further enhance their digital skillset. Hoban et al. investigated the use of animation in primary schools and found that while it was common in classrooms in terms of presentation, it was rarely used in a way that supported students being the “designers and creators of animations” (209). As students co-created their animated stories in Irish, they engaged in discussion and reflection and built upon each other’s contributions through the medium of Irish.

A successful animated story is one that is constructed upon a solid storyline, encompassing four scenes that are logically linked and where the story combines voice, text, images and motion. Appropriate backgrounds, characters, props, music and audio effects are also included to convey context and enhance meaning. Students created 43 animated stories in Irish class during this eight-week period (covering a new curricular theme every two weeks). The teacher observed a marked improvement in their written work, in their comprehension skills and in their willingness to speak in Irish. They created a further 170 animated stories outside of class demonstrating their high level of engagement with this activity. Of those created at home, 79% (n = 133) were in English, 11% (n = 18) were in Irish and 10% (n = 17) were in another language. While their engagement with Irish at home had increased slightly, it was still quite low.

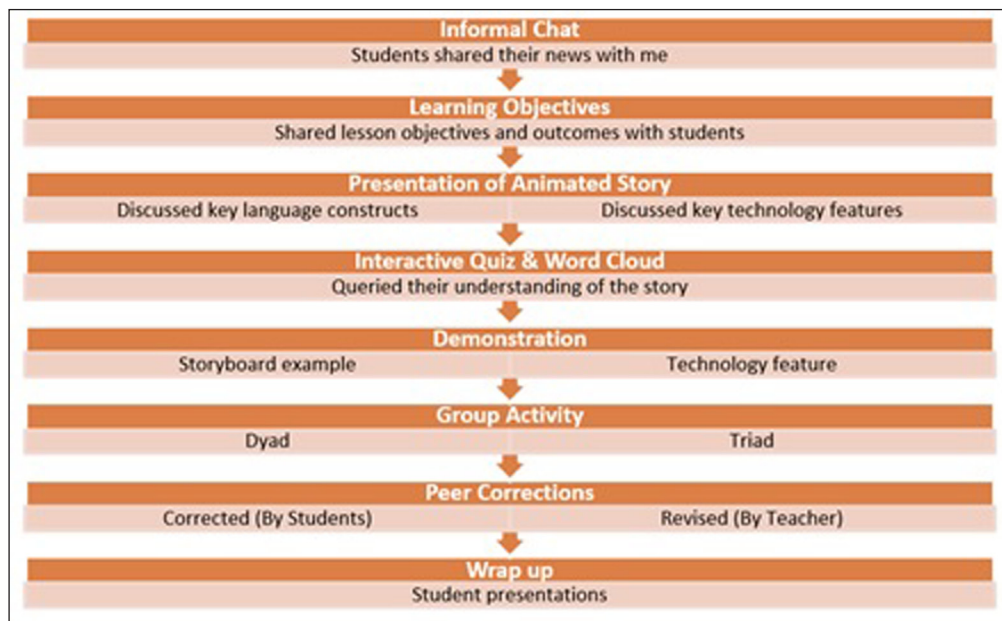


Figure 8 Innovative Irish Lesson Structure (Iteration Two).



Figure 9 Animated Story in Go Animate for Schools.

Modifications Informing Iteration Three

While students argued less in similar-ability groups, more learning occurred in mixed groups – which was the grouping approach maintained going forward. Early finishers of the storyboard activity could move on to the digital recreation activity. Digital badges were implemented to encourage students to speak more Irish in the classroom. Question time (regarding language and design choices) was introduced during activities and at the end of student presentations, embedding learning at a deeper level. Furthermore, to encourage greater engagement with the Irish language outside class, only those students who created Irish animations at home could present in class.

ITERATION THREE – CODED STORYTELLING

In an effort to maintain engagement in language learning and to further develop their digital skillset, coding – another medium for expression and communication (Resnick et al.) – was introduced using an application called Scratch. When students learn to code, they construct representations of the concepts they are learning, thereby deepening their understanding in the process. Coding is a playful way to approach and solve problems through tinkering and discovery (Martinez and Stager) and is viewed as a form of self-assessment (Berry). In their systematic review of technological innovations, Luckin et al. encountered studies demonstrating the positive impact of students creating animations and stories using technology tools such as Scratch.

A successful coded story is defined as one that is constructed upon a solid storyline, encompassing four scenes that are logically linked and where the story integrates voice, text, images and motion. Appropriate backgrounds, characters (sprites), music and audio effects are included to reveal context and enhance meaning. Students created 131 coded stories in Irish class over a ten-week period (five two-week lesson blocks, as in previous iterations). The teacher noted an improvement in their spoken Irish and in their frequency in speaking it: “They are using way more spoken Irish, even outside of Irish class they’re using phrases like ‘feicfidh mé amárach thú’ [See you tomorrow] and ‘bain taitneamh as an lá’ [Enjoy your day] ... they have a better idea of sentence structure as well, they are way better at knowing to start with a verb and not starting everything with ‘tá’ all the time” (Interview 3). Students created a further 104 coded stories outside class – of which 40.4% (n = 42) were in Irish, matching those created in English (40.4%, n = 42). They also commented in Irish on each other’s stories, reflecting increased engagement with the Irish language at home.

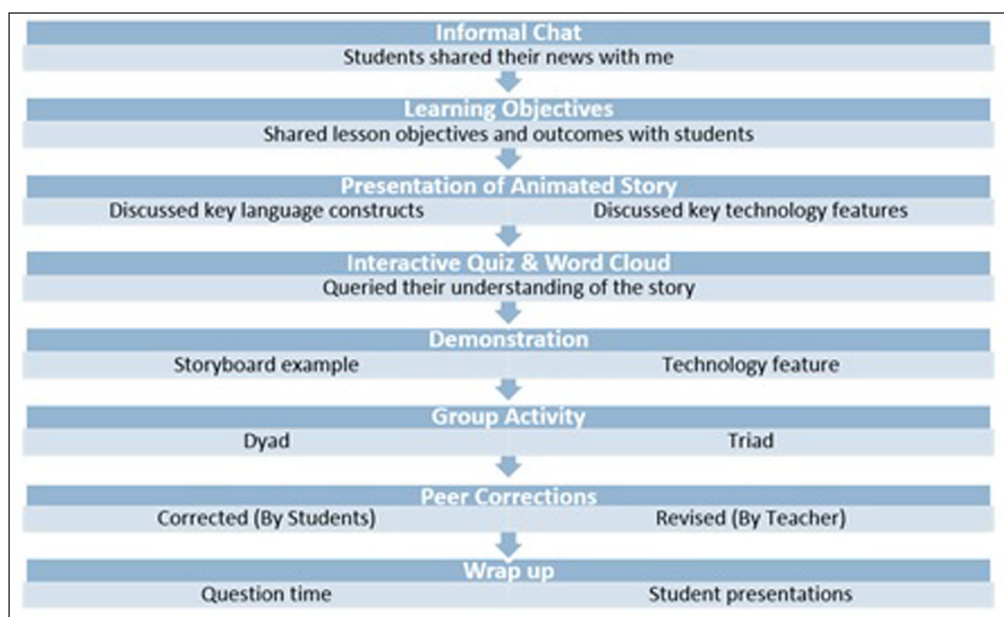


Figure 10 Irish Lesson Structure (Iteration Three).

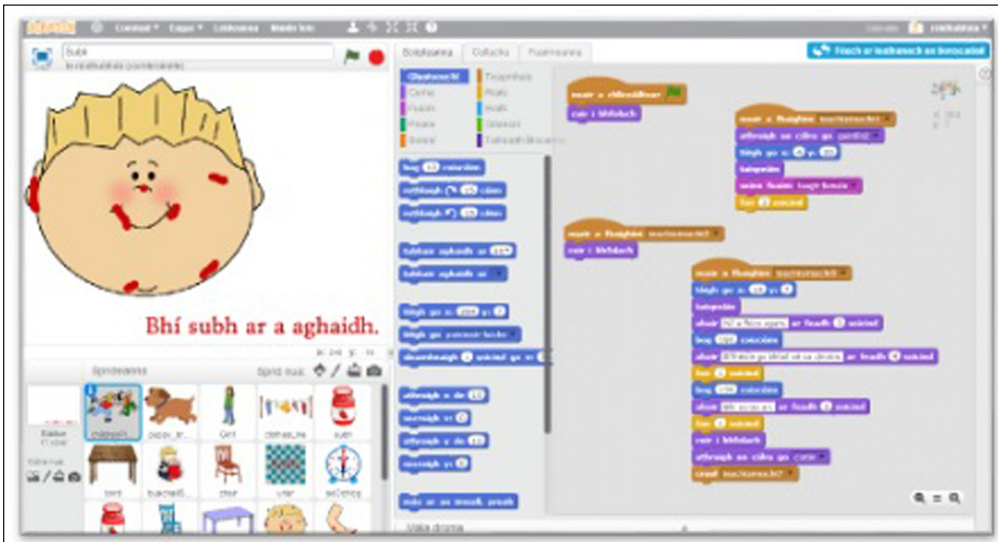


Figure 11 Coded Story in Scratch.

CONTRIBUTION AND FINDINGS

This study culminates in the TALEs (Technology, Activity, Language, Engagement, Story) model, which framed and informed the design and development of the instructional intervention. It supports a student-centred, technology-enhanced, design-based, constructionist and collaborative approach to enhance the Irish-language learning experience in the classroom. Each iteration evolved the concept of TALEs to create more effective, fun and educational Irish-language learning experiences for students, and resulted in a repurposable design model (Hall et al.). TALEs can be adopted and adapted by Irish-language teachers and language teachers in general to support a more active, communicative and creative approach to language learning.



Figure 12 TALEs Framework.

TALES is undergirded by a strong theoretical framework supporting Irish-language learning activities through active collaborative pedagogical approaches and design-based language activities. Curriculum was upheld through students writing stories around curricular themes and drawing on specific language constructs in the process. Technology learning was supported through students engaging in design activities using constructionist tools as they

created digital, animated and coded stories. TALEs integrates all four language skills through the storytelling phase and then maps them to four corresponding multimedia skills during the digital recreation phase, developing language and technology skills in the process.

TALES externalises student thinking while collaboratively creating shareable learning artefacts, negotiating meaning and deepening learning. It explicitly lists lesson objectives and learning outcomes associated with curricular themes encased in textbook chapters. It promotes short bursts of instruction and scaffolded learning; storyboarding in dyads and digital recreation in triads; and peer learning opportunities through group work, peer correction and presentation. Furthermore, TALEs incorporates traditional approaches to language learning during pre-communicative and post-communicative learning activities. In this way, through the combination of screens and pixels and paper and pen, students engage with the Irish language at a deeper level. Most importantly, it engages students in the meaningful production of the Irish language, providing them with increased and spontaneous opportunities to speak and write the language through creative writing and digital recreation activities, and all through the medium of Irish.

DESIGN PRINCIPLES

As is evident in its title, TALEs yields a collection of design principles (Technology, Activity, Language, Engagement and Story) that encapsulate lessons learned during the instructional intervention and can be extended beyond the context in which they were learned. Design principles are “heuristic statements in the meaning of experience-based suggestions for addressing problems” (Plomp 22). They are not recipes for success, however, but offer guidelines for implementing TALEs in other classrooms.

Key Design Principle One: Technology

Technology should be viewed as an “object-to-think-with, that will contribute to the essentially social process of constructing” shareable learning artefacts (Papert, *Mindstorms* 182). The STORIES framework will guide the teacher in selecting appropriate technology tools, especially those encompassing image and audio repositories. Sustaining student engagement through technology variation is important. In this way, learning develops in tandem with challenge level, maintaining deep engagement or the flow experience (Csikszentmihalyi). Flow is a mental state in which a person is fully immersed in an activity. It is characterised by a feeling of intense concentration, full involvement, deep enjoyment and success in the process of an activity.

Students learn technologies through timely instruction bursts and through exploring and tinkering with technology tools. They share their discoveries in the process. They develop digital fluency as they engage in design-based learning activities using constructionist tools. They grow in confidence in their abilities when they experience transfer of learning, making learning even more authentic and worthwhile. However, not every student is equipped with basic computer skills and this needs to be taken into consideration at the outset.

Key Design Principle Two: Activity

Activity in the classroom is achieved through collaborative learning, promoting social interaction among students and between students and their teacher. This interaction leads to knowledge construction. As they compose stories, they adapt to a new way of learning. They learn to embrace uncertainty and to negotiate meaning. By enduring this period of “mental discomfort or cognitive dissonance”, students grow and extend their knowledge (Applefield et al. 43). Through careful and subtle questioning and prompting, and more direct recasting and instruction, the teacher scaffolds their learning and encourages them to persist in their learning endeavours.

While streamed-ability grouping configurations resulted in a more harmonious classroom, learning within groups was superficial compared to mixed-ability groupings where students learned at a deeper level. It might be helpful to stream groups according to similar abilities at the outset, however, until students and their teacher adapt to this new way of learning, before changing to mixed-ability groupings. In order to enhance intergroup communication, groups should be kept to three members, if possible. It would be beneficial to incorporate the “Ask Three Before Me” rule to encourage communication and collaboration, and to use clocks or

timers to encourage better timekeeping skills, especially at the beginning. Students become less reliant on such tools and strategies as they become more accustomed to this way of learning. The teacher also needs to be aware of group dynamics and engage with students regularly to prevent over-dominant members from taking over.

Key Design Principle Three: Language Learning

Immersing students in the Irish language is important, and translation to English should be avoided, where possible. The teacher facilitates learning through scaffolded instruction and short instruction bursts, providing timely feedback on the quality of their learning and guidance in terms of new language. The teacher should encourage students to use the language in their repertoire and to explore new language using dictionaries and textbooks. It might be helpful to work double sessions into the teaching schedule to facilitate collaborative language learning around technology. In addition, image repositories should be searched graphically and localised technology used wherever possible. A reward system such as digital badges will motivate students to speak more in Irish.

Key Design Principle Four: Engagement

Students are intrinsically motivated to learn Irish as they need it for their stories. Engagement is enhanced through small group sizes and designing flow experiences into learning activities where optimal learning occurs (Csikszentmihalyi). Learning needs to be challenging and this can be achieved through sustained variation of technology tools and natural curriculum advancement. Unexpectedly, students re-engaged with digital, animated and coded storytelling voluntarily outside school, indicating their positive experience. They spent three hours a week, on average, working on their stories at home. By the third iteration, the number of Irish animations created equalled the number of English animations – the predominant language used outside the classroom in the previous two iterations. Re-engagement outside the classroom can be encouraged by inviting students to present their Irish stories created at home.

Key Design Principle Five: Story

Through the act of story writing and digital recreation, students engage in Irish-language learning in a fun, authentic and meaningful way. They have to think about, question, discuss and negotiate various language constructs as they write, edit, revise, construct, reconstruct, record, re-record, share and reflect upon their stories. They create shareable learning artefacts that they can show to their peers and parents. Students should present their own digital stories, as this leads to a greater sense of ownership and pride in their work. It is important to include time for questions at the end to delve deeper into language and technical aspects of their stories. If possible, their stories should be shared in a safe secure environment such as a school blog or dedicated technology platform such as Scratch, GA or LBT. A story element can be incorporated into short instructional bursts when demonstrating technology tools. Students might seem apprehensive at the beginning, but they grow to embrace and enjoy the freedom to express themselves and to use their imaginations. The focus should be on story writing, and artwork should therefore be kept to a minimum and completed at the end. Peer correction should be encouraged at the end.

FINAL WORDS

The TALEs model not only offers a possible solution to the problem of underachievement in Irish in English-medium primary schools, but is also a powerful and inspiring example of how Irish can be taught and learned in a meaningful fun way. The language classroom is often viewed as a rehearsal for the outside world, but TALEs offers a different approach, bringing interests from the outside world into the classroom. Students were intrinsically motivated as they worked on their stories because the learning activity was meaningful to them. They took more initiative and responsibility for their own learning, they actively explored and questioned language and experimented with a host of tools as they brought their ideas and stories to life.

Students showed a greater interest in Irish and demonstrated a more positive attitude towards the language. Their comprehension and written skills greatly improved. While their oral skills also improved and students spoke more Irish in the classroom, this was at a more

moderate rate. A more long-term endeavour would certainly yield greater enhancement. Students also became more digitally fluent as they became adept at designing and creating, and they developed interpersonal, communicative and problem-solving skills in the process. TALEs certainly fostered an active, communicative, creative and authentic language learning experience for students in the Irish-language classroom.

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