Personal English Learning Ecologies and Meaningful Input with Digital and Non-Digital Artefacts

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ABSTRACT

This paper analyses self-perceived learning ecologies in relation to EFL/ESL input. To this end, we integrate ecological perspectives with language development theories. In addition, we present data from in-depth and member checking interviews. Our findings indicate a low exposure to extensive written input and oral non-digital input. We discuss possible links between intensive and extensive reading and digital and non-digital oral input. Ultimately, the findings raise interesting questions about the compensatory and complementary roles of in-school learning and out-of-school learning.

Keywords

Personal English Learning Ecologies (PELE), agentic trigger, EFL/ESL out-of-school learning, EFL/ESL input

INTRODUCTION

Input-rich English language settings play an important role in Norway, where many adolescents spend several hours a day in front of a printed text (e.g. course books, novels) or a screen (e.g. TV, iPad, iPhone or computer). This input occurs both in and out of school, and these adolescents use digital and non-digital artefacts for the development of their listening and reading skills (Hatlevik, Egeberg, Gudmunsdottir, Loftgarden & Loi, 2013; Rasmussen, Rindal & Lund, 2014; Røkenes, 2016; Sundqvist, 2009; Vaage, 2014).

Learning sprouts up everywhere, as in an ecology that describes the relation of plants and living creatures to each other and to their environment. EFL/ESL[1] students create, inten-

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1. Proficiency and out-of-school exposure might be relevant reasons for using the term English as a second language (ESL) in Norway, whilst some scholars (e.g. Ørevik, 2015) still favor the term English as a foreign language (EFL). Thus, both terms are used in this article.

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tionally or unintentionally, their own personal English learning ecology (PELE). Yet we do not know enough about this phenomenon. The content of a learning ecology comprises all things inside of the space created for learning. These include people, materials, tools and technologies, information and knowledge resources, mediating artefacts and the individual's learning trajectory (Jackson, 2016; Siemens, 2007). Accordingly, Barron (2006) defines a learning ecology as a set of contexts 'comprised of a unique configuration of activities, material resources, relationships, and the interactions that emerge from them' (p. 195).

To date, few published studies have combined an ecological perspective with theories of language development. This study[2] aims to integrate these two strands of theories by mapping and analysing opportunities for English language learning through meaningful input in and outside school. In contrast to a former study on PELE related to output (Cabot, 2016), the same phenomenon is subjected to a new analysis in a different field, particularly in terms of the predominance and affordances of certain digital and non-digital input artefacts.

The article begins with a review of existing research, followed by theoretical concepts on agentic triggers and meaningful input. We then present and discuss the findings on input both from an artefactual and a language development perspective.

EXISTING RESEARCH ON ORAL AND WRITTEN INPUT

Several studies have demonstrated the importance of reading for EFL/ESL learners (e.g. Camiciottoli, 2001; Gradman & Hanania, 1991; Janopoulos, 1986). Similarly, Kelly (1981), Meringoff (1980) and Salomon and Leigh (1984) compared TV programs with printed media. These studies concluded that reading requires more mental effort than listening. In his study on incidental vocabulary acquisition from reading and listening, Teng (2016) revealed that learners can acquire new words in both modes, but gain more word knowledge through reading.

There is some evidence that learners are at an advantage when they both hear and see words (Guichon & McLornan, 2008; Liang, 2013; Wagner, 2010). A number of studies have demonstrated the positive effects of subtitling (Baltova, 1999; Borrás & Lafayette, 1994; Garza, 1991; Neuman & Koskinen, 1992; Vanderplank, 1988, 1990). According to Hayati and Mohmedi (2011), bimodal subtitling is more effective than L1 (first-language) subtitling or no subtitling.

Sundqvist (2009, p. 117) reported that students are exposed to much extramural English (EE) oral input, such as 'listening to music' and 'watching films'. Conversely, there is limited time spent on reading newspapers, magazines and books. Furthermore, her research barely mapped input while playing videogames. Brevik's (2015) research on reading skills in upper secondary-level national reading tests found many poor readers in vocational studies. She identified an interesting group of male 'gaming outliers' (Brevik, 2016, p. 40) who were better readers in EFL/ESL than in their L1 Norwegian. Brevik's (2015, 2016) research, however, solely focused on reading skills and not on written and oral input in a broader ecological perspective. This is the focus of the present study.

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2. This study contributed modestly to the research project 'Learning in the 21st Century' at Western Norway University of Applied Sciences, formerly Stord/Haugesund University College.

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THEORETICAL FRAMEWORK: TOWARDS AN INTEGRATION OF ECOLOGICAL AND LANGUAGE-LEARNING DEVELOPMENT THEORIES

Artefactual Issues: Agentic Triggers Within Learning Ecologies

Ecological transitions occur when learners change their ecological settings (Bronfenbrenner, 1979, 1994). The type of digital or non-digital artefact used during these transitions is important when describing a student's PELE. Moreover, theories on affordances (Gibson, 1979; Hammond, 2010) can explain the possible use of certain artefacts. In this section, we describe different definitions of affordances. The end of the section presents a study-specific notion of agentic triggers as a subgroup of affordances.

Affordances are action possibilities or 'preconditions for activity' (Greeno, 1994, p. 340). For instance, a knob affords twisting or pushing while a cord affords pulling. Norman's (1999) approach derives more from perceived affordances. While in Gibsonian terms a door without any handle is an affordance, Norman's definition requires that there must be a door handle to signal the direction of opening to an actor (McGrenere & Ho, 2000). Furthermore, the distinction between direct and indirect affordances may help to clarify the use of certain artefacts in PELEs. According to Van Lier (2004),

> [d]irect affordances refer to such things as prosodic features (rhythm, voice quality, intonation, stress, etc.), gestures, facial expressions, posture, eye gaze, hesitations, repetitions, etc.; all of these in a variety of synchronized combinations. Indirect affordances are of a social and cognitive nature: remembered practices, familiarity with cultural artefacts, conversational and situational logic. (p. 90)

In contrast to Van Lier, Salomon and Perkins (2005) adopt a more cognitivist view of affordances as intellectual amplification *with*, *of* and *through* technology. They thus define affordances as

> […] effects with technology, amplifications of cognitive capability as the technology is used; effects of, residual effects without the technology that is due to substantial experience with it; and effects through, effects largely with the technology that go beyond simply enhancement to a fundamental reorganization of the cognitive activity in question. (p. 84)

In the case of 'effect with' mentioned above, there is an intellectual partnership between the tool and the individual using it. The technology has to do things actively, thus increasing the user's cognitive capability. As one example of this active technology, Salomon and Perkins (2005) refer to a computer's spell-check function. This adds real value because 'the partnership frees the user from the distractions of lower level cognitive functions' (p. 74).

In the present study, we favour the term *agentic trigger* instead of affordances to describe special phenomena linked to repetitive occurrences within a PELE that result from an interaction between both a user (agent) and an artefact. For example, in a book, we can characterise the repetitive use of pictures and appropriate paratexts as possible agentic triggers for students. In other words, they function as catalysts for reading the whole book (Bland & Lütge, 2013; Wiland, 2016).

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Language Development Issues: Meaningful Input

Krashen's (1982, 1985, 1989) input hypothesis has exercised a powerful influence on the theory and practice of second-language acquisition. In his view, input is central to all language acquisition,[3] and English teachers must ensure that learners receive sufficient comprehensible input. Table 1 illustrates different forms of input.

Table 1 Different forms of input based on Krashen's Input Hypothesis

i+2	=	The learner does not really learn English, the input being too pushed
i+1	=	The learner learns English by means of a pushed input
i+0	=	The learner does not really learn English, the input being too easy

Input might be more advanced than the current level of the learner's language (i+1). Similarly to Swain (1993, p. 160), we consider such pushed input meaningful and beneficial for learning English. For example, learners often do not understand a certain word at the very beginning of a conversation, but elicit the meaning of it by the end of a conversation. However, when the input becomes too difficult, it ceases to be of benefit to the learner (i+2). Conversely, learners should avoid overusing situations that under-stimulate or inhibit (i+0) learning (Ameri & Mohseni, 2010).

Furthermore, the distinction between intensive and extensive reading (see Palmer 1917/1968) is of particular importance for the present study. The term 'intensive reading' relates not only to how we read (goal-focused reading) but also to text length. Word repetitions, which are beneficial for vocabulary learning (e.g. Folse, 2006; Piirainen-Marsh & Tainio, 2009; Sundqvist, 2009), occur less frequently in shorter texts. On the other hand, many studies stress the efficacy of extensive reading, especially in relation to vocabulary knowledge (e.g. Catalán & Francisco, 2008; Lao & Krashen, 2000; Sheu, 2003) and reading comprehension (e.g. Bell, 2001; Mason & Krashen, 1997; Sheu, 2003). This study posits that Day et al's (2015) definition of extensive reading captures many aspects of meaningful input: '[read for] overall understanding, read a lot… read for meaning in English, no direct study of grammar, no comprehension questions, no direct teaching of strategies' (p. 13).

Tanaka and Stapleton's (2007) empirical study on the efficacy of extensive reading stresses the importance of easy readers. Notwithstanding, Oh's (2001) investigation of written input modification—simplification and elaboration—supports modifying input in the direction of elaboration rather than artificial simplification. Studies of oral input modification also provide some evidence for the advantage of elaboration (e.g. Chaudron, 1983; Chiang & Dunkel, 1992; Choi, 1994).

While both EFL/ESL learning and the use of technologies in learning ecologies have been widely researched, few studies to date have combined the two. Van Lier (1997, 2000, 2004, 2010) is an exception, but his research does not account for recent digital advances. This study aims to account for such recent advances and to integrate artefactual issues with language development theories. We address this issue by asking: What role do input-related digital and

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3. Krashen's input hypothesis has been challenged by many researchers, who have argued that comprehensible input alone is insufficient for L2 acquisition (e.g. Ellis, 1993, 2008; Long, 1996; Swain, 1985, 1993, 1995).

non-digital artefacts play in upper secondary students' self-perceived PELE in the past and the present? More specifically, this study addresses this issue through two research questions:
1. Which input artefacts do students (predominantly) use in or out of school?
2. What is the reason for using or not using certain input artefacts?

DESIGN AND METHODS

Interviewees and Ethical Considerations

Inspired by Brevik's (2015, 2016) research, we conducted an enquiry on the learning Platform "It's Learning"[4] (ITL) at an upper secondary school in Norway. The goal was to determine which students had better grades in English than in Norwegian (phase 1). Following a qualitative approach, we carried out in-depth interviews (phase 2) and member-check interviews four months later (phase 3). These were both approximately 30 minutes in duration and took place in Norwegian with 12 of these students. We conducted the interviews with informed consent and treated all information confidentially.

Semi-Structured Interview Guide

The interviews had a semi-structured format, which enabled both dynamic and systematic data gathering (Borg & Gall, 1989; Galletta, 2013). We used face-to-face (FtF) interviews to elucidate students' PELE or digital 'learning lives' (Erstad, 2013, p. 14). These also aimed to give 'issue oriented' explanations (Nagy Hesse-Biber & Leavy, 2011) on the *where* and *why* for artefact usage (p. 95). The questions in the interview guide addressed three issues: (1) digital vs non-digital artefacts; (2) in-school vs out-of-school learning; and (3) listening vs reading artefacts. We analysed these in two distinct temporal dimensions of English learning: at elementary and lower secondary school (the past) and at upper secondary school (the present). Some open questions occurred several times in the second and especially third phase of the study.

Phases of the Study

The first phase consisted of an ITL study of upper secondary school students who had achieved better grades in English than in Norwegian in their previous school year. From a population of approximately 1,000 students, 208 answered the questionnaire, and 73 met the inclusion criterion (gross selection). Of these, 16 students (net selection) scored two grades better in English than in Norwegian, with a lowest English grade of 4. From this sample, 12 randomly chosen students participated in interviews.

The second phase comprised 12 in-depth interviews with these students. The main focus was on *which artefacts* the students used and *where* they used these artefacts predominantly: in or out of school (see research question 1). This phase was more *exploratory*. Semi-structured interviews mapped input-related artefacts and placed them within in-school or out-of-school learning contexts.

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4. http://www.itslearning.co.uk/

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In the third phase, more *analytical* interviews took place. The interviewees had to give issue-oriented explanations on *why* they used certain artefacts to develop reading and listening skills (see research question 2). The further purpose of these interviews was to confirm findings from the first in-depth interviews and to seek any missing information (Silverman, 2010). Radiographic representations of their own learning ecologies (see Figure 2) were presented to all interviewees.

Analysis

We used *HyperTRANSCRIBE* for the transcription and developed a qualitative code book (Creswell & Clark, 2011). For analysis of artefactual issues, we used the codes *agentic triggers* and *direct* vs *indirect affordances* (Van Lier, 2004). Analysis of language development employed other codes, such as *intensive* vs *extensive reading artefacts* (Day et al., 2015) and the codes *i+1* (Krashen, 1982, 1985), representing meaningful pushed-input situations. The codes fell into three different categories, namely (1) digital vs non-digital artefacts, (2) in-school vs out-of-school learning and (3) listening vs reading artefacts. Our coding was both open and axial (Corbin & Strauss, 2015). Open coding applied more to the second explorative phase of the study, whereas coding became more axial and interpretative in the third phase. Transcriptions determined the categorisation of essential moments, such as the codes *i+1*. However, distinguishing between more or less important *i+1* situations (agentic triggers) and comparing them to *i+2* and *i+0* depended on the researcher's interpretation and was therefore more axial (Marshall & Rossman, 2011). Figure 2, which will be explained in the discussion of our findings, represents such an attempt to develop a temporal and locational conceptualisation of ecological transitions as a radiographic illustration.

FINDINGS

Self-Reported Use of Listening and Reading Artefacts in and out of School

In this section, we first describe a possible predominance of certain artefacts in and out of school. After this overview, we detail some student narratives of self-reported PELE (see research question 1), previously classified into reading and listening artefacts. In terms of self-reported predominance, all interviewees other than Jane and Nick felt there was more reading at upper secondary school than at home. Most interviewees used more digital artefacts at home than at school.

The digital artefacts students used most commonly at school included PowerPoint presentations, short YouTube videos, documentaries and links on ITL. Non-digital reading artefacts predominated, and the use of screen reading for longer texts (e.g. Kindle or iPad) remained limited, both in and outside school. While students seemed to use screen-based reading more often for shorter texts, they preferred non-digital sources such as books for reading longer texts, both in and outside school. Beth and Frank were the only interviewees who had listened to audio books (e.g. *Harry Potter* and *Animal Farm*). Outside school, listening artefacts prevailed more often, and reading artefacts generally played a minor role. While shorter texts (e.g. course books) were more common in lower secondary school, longer texts (e.g. short stories or novels) were more frequent in upper secondary school.

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Regarding reading artefacts, the interviewees used both digital artefacts (out of school: Instagram, Facebook News Feed, subtitled films and serials, Twitter and chats; in school: PowerPoint and ITL) and non-digital artefacts (out of school: e.g. *The Pillars of the Earth*, *Harry Potter*, *Sweet Little Lies*, *The Maze Runner*, *Diary of a Wimpy Kid* and *Sapiens: A Brief History of Humankind*; at school: *Animal Farm*, *Of Mice and Men*, 'Sonnet 18', *The Story of an Hour*, *Fantastic Mr. Fox* and *Not That Kind of Girl*). Pauline believed her English input was quite high when using digital artefacts, such as Tumblr. In contrast to Lily, Frank did not see any benefit to his English learning from reading hashtags on Instagram. Ally's excerpt here illustrates the important use of non-digital reading artefacts. In the following quote, she mentions an interesting repetitive but slightly different use of Shakespeare's 'Sonnet 18' at lower and upper secondary school:

> We had some poems, such as Shakespeare's 'Sonnet 18'… It was really good to have gone through it at lower secondary school… It was just wonderful to show that I already knew a lot about it… at lower secondary, we focused much more on the analysis of the poem. This time, we discussed other issues raised in the poem much more deeply.

The quote above shows the importance of non-digital reading skills. However, in terms of listening, the interviewees' responses indicated that they used both non-digital (teacher, parents and peers) and digital listening sources (out of school: films, serials and songs; in school: documentaries, YouTube, audio files and Kahoot quizzes). Jane reported that watching a series outside school was important for her vocabulary improvement. Similarly, the *Tucker Car Show* on TV helped Bill to learn words such as 'carburettor'. Furthermore, the interaction between teachers and students at school was a valuable input. For example, Lily remembered being corrected by her teacher when she had pronounced the word 'development' as *[dɪvəˈlɒpmənt] instead of /dɪˈveləpmənt/. Bill also discovered the importance of his teacher in developing his received pronunciation (RP):

> Many people commented on my nice British accent. I wonder why I speak like that. Almost everything on TV and most films I watch are in American English. Perhaps this British teacher at lower secondary school… it might be that this teacher who also happened to be my class teacher influenced my accent.

In addition to the teacher, other input sources, such as films, documentaries and Power-Point presentations, were valuable input at school. Frank reported an important moment in his learning life between fifth and seventh grade when he suddenly stopped reading subtitles at home. He described this crucial moment as follows:

> I grew up with reading subtitles while watching films and TV. One day, I asked myself whether I would be able to watch a film without reading subtitles. And it happened… I do not know exactly when, but suddenly I could watch a whole TV program without reading the subtitles. This was a kind of strange and wonderful feeling.

This excerpt illustrates the importance of oral input outside school. Frank also stressed the importance of listening sources for vocabulary acquisition. He described one such instance when watching the film *The Matrix*:

I learned the word 'inevitable' thanks to a specific scene in the film. I think it was in the second film where Neo had to fight against many of Agent Smith's men… in the conversation between Neo and Mr. Smith in the beginning…when everybody jumps on him and he is trapped… in this moment, he whispers in his ear 'it is inevitable'.

Self-Reported Reasons for Using or Not Using Certain Artefacts

This section analyses the interviewees' self-reported reasons for using certain artefacts to learn English, whether intentionally or unintentionally (see research question 2).

In terms of reading artefacts, students reported the following main reasons: use of two different languages (e.g. bilingual blog *Krissi*), reputation of the authors (e.g. 'Sonnet 18', *The Catcher in the Rye*), content, suspense, action and writing style (e.g. *The Pillars of the Earth*), use of pictures and slapstick comedy (e.g. *Diary of a Wimpy Kid*) and 'reading hours' at school.

On the other hand, students also used listening artefacts to improve language learning. The informants stressed the following reasons: word repetitions, level of playfulness and content (e.g. podcasts, Skyping and gaming), reputation of films and series (e.g. *House of Cards*). The following paragraphs elucidate six self-reported reasons for choosing certain artefacts that supposedly contributed to language learning.

First, concentration and interest seemed to be of particular relevance. Frank mentioned that listening to an audio book of *Animal Farm* was much easier than reading. Outside school, Fanny reported having read many English children's books in her childhood. However, she now preferred Ken Follett's historic novels. In contrast to all other informants, Jane believed that she had read several novels because of 'reading hours' (*lesetimer*) in the classroom:

> At lower secondary, we had reading hours every day. One day we chose something in Norwegian Civilisation, one other day we read something in English. It was during these reading hours that I read the books *Orange Is the New Black* and *Not That Kind of Girl*.

A second reason was the bilingual structure of some blogs. This duality gave Lily the opportunity to compare and learn new words. She described the reasons for reading blogs in the following words:

> The blogs I really like reading often deal with clothing and travelling. Krissi or Maylife, for example…write some of their blogs both in Norwegian and English… I think it is interesting to see the differences between the paragraphs written in Norwegian and English… And I want to stay informed when it comes to new words in terms of clothing.

Lucy and Frank mentioned a third reason, namely the content and use of pictures. Lucy read *Me Before You* because it was a well-written book in which the content was a trigger to read the whole book. Frank read the first and second *Diary of a Wimpy Kid* books in sixth grade. When asked to reflect on the reasons for having read this book, he stated the following:

> I chose this book because it looked really nice… There were many drawings in the book…Such visual humour is easy to understand for children. It was easy to laugh… There was a lot of slapstick comedy.

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A fourth reason involved the level of difficulty. Frank tried to read books such as *The Adventures of Sherlock Holmes*, but the input proved too difficult. He believed films were easier because the camera shows every detail, as in the new TV series *Sherlock*. In the book, the reader must find the conclusions and imagine the details himself.

Beth reported a possible fifth reason. In contrast to Frank, Beth believed that she learned a lot through word repetitions when Skyping, reading chats, listening to podcasts or playing games, such as *Assassin's Creed* or *League of Legends*.

Jane mentioned a last reason that could relate to reading subtitles while watching TV. She described her English learning in the following words:

> I also learnt English when I watched *House of Cards*. It was difficult in the beginning because you have to know a little bit about American politics before watching it. Many terms are used here which are difficult. I heard the word 'whip' for example and read the Norwegian word *innpisker* in the subtitles, but it did not make any sense. I had to Google the word.

These either intentional or unintentional reasons for using certain artefacts contributed to language learning, according to our interviewees. We use artefactual issues and language development theories to understand these findings in the following section.

DISCUSSION

The Self-Perceived Predominance of Artefacts in and out of School

This section discusses the findings related to research question 1 and describes the self-perceived predominance of artefacts in two areas: (1) digital vs non-digital written and oral input and (2) intensive vs extensive written input.

The interviewees reported a general predominance of reading at school (both lower and upper secondary) in contrast to more oral input at home. In general, reported out-of-school reading was considered quite low, a tendency that previous studies confirm, including Sundqvist (2009) and Forsman (2004). As Teng (2016) noted, the problem may be that students learn fewer words if they do not read enough. More specifically, in terms of digital or non-digital input predominance, the following figure suggests that in-school learning has a compensatory or complementary function in relation to out-of-school learning.

	Non-Digital Sources	**Digital Sources**	
Out-of-school learning	🟥	🟩	Oral Input
	🟥	🟧	Written Input
In-school learning	🟧	🟥	Oral Input
	🟩	🟥	Written Input

Red = low intensity, Yellow = medium intensity, Green = high intensity

Figure 1 Self-perceived written and oral input in and out of school.

Figure 1 shows a possible disparity between both out-of-school and in-school learning and written and oral input. On one hand, written input seemed to prevail in terms of non-digital sources at school, whilst oral input seemed to be the winner in terms of digital sources outside school. The situations with medium intensity input might indicate some cases of imbalance. The interviewees indicated that in-school learning with non-digital sources probably focused too much on written input and not enough on oral input, while students' digital sources outside school did not prioritise written input. On the other hand, comparing in-school with out-of-school learning, digital oral input ranked high outside school while it was low at school. This was due to gaming communities, audio-only (e.g. podcasts or music) or audio-visual input (e.g. films or serials). The oral input at school was mainly non-digital (e.g. teacher-student or peer-peer input). These findings align with several earlier studies (e.g. Piirainen-Marsh & Tainio, 2009; Sundqvist, 2009; Sundqvist & Sylvén, 2014). The present findings also indicate that our interviewees often had to go to school to experience interactive non-digital oral input; in this regard, school served a compensatory function.

Another interesting question in this study concerns the predominance of intensive or extensive reading. The following table clarifies the relationship between intensive/extensive reading, lower/secondary school and in-school/out-of-school learning for all 12 interviewees.

Table 2 Self-reported extensive and intensive reading in school and out of school at lower and secondary school age (n=12)

	Extensive Reading	**Intensive Reading**
Lower secondary school (ages 13–16)	– (2/12)	+ (12/12)
Upper secondary school (ages 16–19)	+ (10/12)	+ (12/12)
Out-of-school learning (ages 13–16)	+ (8/12)	+ (12/12)
Out-of-school learning (ages 16–19)	– (4/12)	+ (12/12)

– = low, + = high, + = more than six informants, – = less than six informants

Many students were extensive and intensive readers both at upper secondary school and in out-of-school learning from ages 13–16. However, reading at least two novels or short stories categorised the informants as extensive readers. Reading texts shorter than short stories qualified them as intensive readers. Out-of-school extensive reading at ages 16–19 ranked lower than at ages 13–16. Conversely, only two informants considered themselves extensive readers at lower secondary school. In other words, extensive reading was low at lower secondary school, with two exceptions: Nick (easy readers *Fantastic Mr. Fox, Mathilda*) and Jane (*Not That Kind of Girl, Orange Is the New Black*). Nick experienced input simplification, whereas Jane used input elaboration by reading authentic novels during reading hours at lower secondary. Scholars still hotly debate the pros and cons of input simplification in contrast to input elaboration. Tanaka and Stapleton (2007) stress the importance of input simplification (e.g. easy readers), whereas Oh (2001) supports the view that elaboration is better than artificial simplification. However, in cases of non-existing input elaboration or low

extensive reading at ages 13–16, input simplification might still be a good choice to increase extensive reading. Input simplification seemed to be much more accepted in course books than in easy readers. The use of course books might lead to more intensive reading, while easy readers promote extensive reading. A certain imbalance between input simplification (e.g. course books, easy readers) and input elaboration (e.g. novels, short stories) might explain the lack of extensive reading. For this reason, lower secondary schools might consider a more balanced approach of input simplification and elaboration to implement more extensive reading (Catalán & Francisco, 2008; Day et al., 2015; Sheu, 2003). This is noteworthy because most interviewees reported having to read longer texts (e.g. short stories or novels) at upper secondary school. All informants were much more used to reading shorter texts outside school. Conversely, our informants read longer texts more outside school than at school at ages 13–16. Thus, school seems to serve a complementary function in this regard.

The present findings also highlight an interesting link between screen reading and intensive reading. The interviewees reported that intensive reading was more likely to occur at home (as in subtitles, Facebook News Feed, chats or hashtags) than in school (as in course books), and in lower secondary rather than upper secondary school. This invites a question as to whether students at lower secondary school read to learn rather than learn to read. According to Day et al. (2015), 'students learn to read by reading, not by translating, studying grammar, or acquiring learning strategies' (p. 13). All interviewees claimed to use screen reading mostly for intensive reading (shorter texts and full understanding) both outside school (Instagram, Facebook News Feed or TV subtitles) and at school (Power-Point or ITL). For extensive reading, the interviewees of this study preferred non-digital reading (e.g. from a book).

Agentic Triggers and Pushed Input

Regarding research question 2, the findings indicate that the interviewees often had recourse to books with many pictures at elementary and lower secondary school. The iconotext seemed to be of particular importance in graphic novels, such as *Diary of a Wimpy Kid*, that Frank and Jane mentioned in this study. On Norman's (1999) definition of affordances, the pictures may trigger the reading of paratexts. According to Wiland (2016) and Bland and Lütge (2013), the effective and repetitive use of pictures and paratexts may also form an agentic trigger, prompting students to read a whole book.

In contrast to L1 subtitling, advantages of bimodal subtitling (see e.g. Hayati & Mohmedi 2011) might also be discussed in this article. For instance, Jane learned the English word *whip* from the series *House of Cards*, triggered by the repetitive translation *innpisker* in the L1 subtitling. However, Frank exhibits the positive effect of bimodal subtitling. He learnt the word *inevitable* by means of a specific scene in the film *The Matrix*. The underlying hypothesis here is that English learners are better off when they both hear and see. This aligns with many previous studies (Guichon & McLornan, 2008; Liang, 2013; Wagner, 2010).

Moreover, Frank's case raises the issue of whether students learn more from reading a book (such as *The Adventures of Sherlock Holmes*) than from watching a series based on that book. When reading a book, readers must draw conclusions and imagine the details

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for themselves. Several studies (e.g. Kelly, 1981; Meringoff, 1980; Salomon & Leigh, 1984) have concluded that reading requires more mental effort than watching TV.

Beth believed that reading blogs or chats while gaming or using Tumblr or Pinterest was important for her vocabulary acquisition because these artefacts repeated the same words frequently. This aligns with the earlier findings of Folse (2006), Piirainen-Marsh and Taino (2009), Teng (2016) and Sundqvist (2009).

Lily found it interesting to see the differences between paragraphs written in Norwegian and English in bilingual blogs pertaining to clothing. This suggests that the repetition of new words in English and Norwegian may be an agentic trigger for the further development of Lily's learner language. Reading bilingual blogs might amplify cognitive capabilities by means of a 'person plus' or an 'effect with' (Salomon & Perkins 2005, p. 84).). Here, the reader wants to read something about a particular subject in Norwegian while also learning how to say it in English to communicate with others. In this case, the technology may offer real added value, as the reader can avoid Googling words or looking them up in a dictionary and is 'freed from the distractions of lower level cognitive functions' (Salomon & Perkins, 2005, p. 74).

For Ally, reading *Animal Farm* was a meaningful experience (i+1), but the novel *The Catcher in the Rye* was too difficult (i+2). Watching *The Vampire Diaries* did not improve her English (i+0) because the input was too easy. Figure 2 illustrates meaningful and non-meaningful input and agentic triggers in Ally's self-reported PELE.
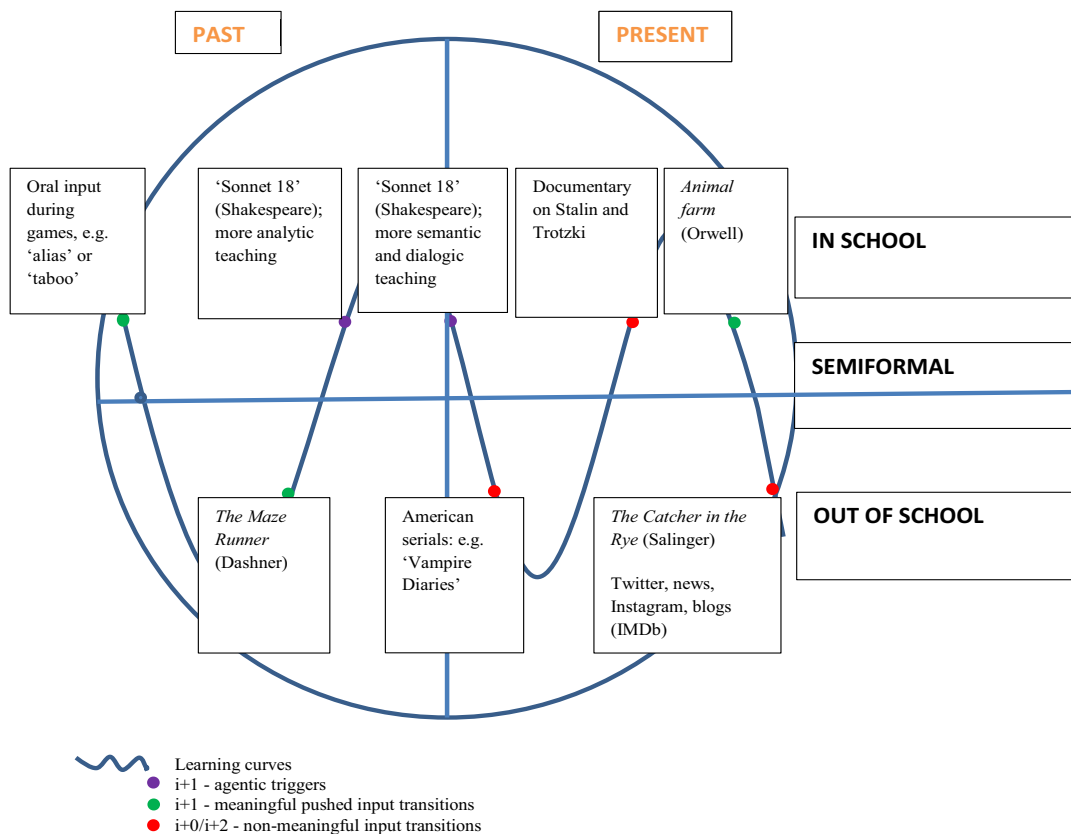
Figure 2 Ally's self-reported ecological transitions

Both Krashen's (1982, 1985, 1989) input hypothesis and Van Lier's (2004) distinction between direct and indirect affordances may be useful when trying to understand learning ecologies, such as Ally's PELE. Because of their repetitive occurrence, ecological transitions become more important and may relate to Van Lier's definition of affordances. Van Lier discussed indirect affordances in cases of 'familiarity with cultural artifacts' (p. 90). For instance, Ally was familiar with Shakespeare's literary work when she re-read 'Sonnet 18' in upper secondary school. Because two different reading approaches of the same literary work triggered learning, we might talk about an agentic trigger in Ally's PELE. On the other hand, Bill's PELE manifested direct affordances when he asked himself whether his British English teacher at lower secondary school may have been a decisive input to his RP pronunciation. Van Lier (2004) explicitly mentions prosodic features as possible direct affordances.

Table 3 summarises other pushed input situations that may be linked to Krashen's input hypothesis (1982, 1985, 1989).

Table 3 Different forms of written and oral input in school (green) and outside school (blue) based on Krashen's Input Hypothesis

i+2	Too difficult input	Ralph: *Romeo and Juliet* Pauline: *Fahrenheit 451, The Catcher in the Rye*, documentary on Stalin Franck: Book *Sherlock Holmes* Lucy: Film *Dead Poets Society* Ally: *The Catcher in the Rye*, documentary on Stalin
i+1	Positively pushed input	Nick: Book *The Book Thief* Ralph: Computer reviews Jane: Songs 'Ordinary Love', 'Oh Wonder, I Drive', Books *Not That Kind of Girl, Orange Is the New Black* Pauline: Film *Dead Poets Society* Lily: *New York Times* Bill: TV *Tucker Car Show* Ally: 'Sonnet 18', *Animal Farm* Beth: Short story 'The Story of an Hour', poem 'The Raven'
i+0	Too easy input	Fanny: Instagram Jane: Teacher speaking English infrequently at lower secondary Bill: Kahoot quizzes Franck: Instagram

As mapped in Table 3, it is noteworthy that most self-perceived i+1 situations at school relate to non-digital artefacts, except the film *Dead Poets Society*. Furthermore, our interviewees perceived Instagram outside school and Kahoot quizzes at school as insufficiently pushed input.

LIMITATIONS

This study has some limitations that might affect the interpretation or generalisation of the results. It does not give an exhaustive image of ecological input transitions within upper secondary students' learning trajectories. Undeniably, there are many pitfalls in self-reports because the evidence comes from what the informant thinks and remembers

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(Kvale & Brinkmann, 2009; Mays & Pope, 1995). However, as Nisbett and Wilson (1977) have argued, the recall of salient events in self-reports may often reflect actual events. This is because interviewees focus on implicit theories concerning internal events rather than automatic processes. On the other hand, iterative questioning in all interviews (Shenton, 2004) and member checking in the third phase of this study (Stanley, 2015) may have improved the stability of this research.

According to Patton (1999), three techniques can enhance qualitative data analysis: (1) testing rival explanations, (2) negative cases and (3) triangulations. In this study, rival explanations arose when the interviewees discussed audio-only conditions and audiovisual conditions. Regarding the first point, this research identified two new subgroups of listening artefacts. Second, this study searched for negative cases by focusing not only on i+1, but also on i+0 and i+2 input situations. Finally, this study employed two different methods of triangulation: methods triangulation and theory/perspective triangulation (Patton, 1999). The former involved the use of three different kinds of data collection: an ITL enquiry in phase 1, more open semi-structured interviews in phase 2 (Borg & Gall, 1989) and more axial member checking in phase 3 (Lincoln & Guba, 1985; Seale, 1999; Stanley, 2015). The study also adopted different theories and perspectives, distinguishing between (1) digital vs non-digital artefacts, (2) in-school vs out-of-school learning and (3) listening vs reading artefacts. In addition, it linked these categories to theories of technological learning ecologies and language learning. These forms of triangulation can also be expected to enhance the study's credibility. In general, the study was characterised more by transactional than transformational validity (Cho & Trent, 2006; Koelsch, 2013).

CONCLUSION

This self-report study mapped and elucidated the importance of meaningful input within PELEs in the past and present experiences of 12 upper secondary students. In so doing, it provides valuable new information about those broader conceptualisations of second-language acquisition that emphasise the importance of ecological and linguistic aspects. This research also adds to the present body of knowledge on in-school and out-of-school EFL/ESL learning. To this end, it emphasises the importance of reading outside school by means of input elaboration, in accordance with Oh (2001). It remains in question, however, whether lower secondary schools should do more to act on existing findings. For example, the positive effects of input simplification by easy readers can serve to increase extensive reading in general (Catalán & Francisco, 2008; Day et al., 2015; Lao & Krashen, 2000; Palmer, 1917/1968; Sheu, 2003; Tanaka & Stapleton, 2007).

It seems clear that there is a gap between lower and upper secondary schools in terms of intensive and extensive reading. Similarly, there is a gap between out-of-school and in-school learning in terms of listening and reading. Contrary to Teng's (2016) recommendation, reading seems less frequent outside school than listening. Likewise, reading at upper secondary school may prove too challenging because lower secondary school does not expose students to extensive reading.

In mapping the students' PELEs, the distinction between pushed input situations and more meaningful agentic triggers that featured repeated artefact use was of particular

importance. In particular, appropriate iconotexts and paratexts in graphic novels and bilingual blogs formed agentic triggers outside school. In contrast, this study revealed both direct affordances (as in the input provided by an RP-speaking teacher) and indirect affordances (as in the repetitive input situation with 'Sonnet 18') at school. Together, all these in-school and out-of-school conditions constituted essential learning opportunities that featured the efficient creation of agentic triggers.

One important implication of this study is that schools serve an important complementary function in the case of intensive versus extensive reading. Moreover, they serve a compensatory function in the case of non-digital versus digital listening. It seems that most students have to go to school to experience non-digital listening. In this study, most meaningful i+1 input situations related to non-digital artefacts at school, and most cases of screen reading involved intensive reading. Future research should focus on possible links between listening and reading. In addition, studies should explore meaningful combinations of digital and non-digital artefacts in EFL/ESL learning in and outside school.

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