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Explicit phonetic instruction vs. implicit attention to native exposure: phonological awareness of English schwa in CLIL

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Abstract: The present study aims at determining whether instruction in the form of explicit phonetic training and of implicit exposure to native input impacted Content and Language Integrated Learning (CLIL) students' phonological awareness of the occurrence of English *schwa* in unstressed syllables of content words (*bacon*). Four intact CLIL groups were administered a perception task immediately before and after an intervention period of one month in which two groups underwent explicit instruction on the incidence of reduced vowels versus full vowels in English disyllabic words while another group was exposed to native input in their CLIL sessions. A fourth CLIL group with neither explicit intervention nor native teacher input served as control group. All four groups tended to judge both *schwas* and full vowels as correct in the pre-test, indicating that they were not knowledgeable of the general pattern of vowel reduction occurrence in unstressed syllables in English prior to intervention. In the post-test, the three experimental groups significantly improved their ability to identify full vowels as incorrect, the groups receiving explicit instruction exhibiting higher gains than the group which was implicitly exposed to native input.

Keywords: phonological awareness, vowel reduction, CLIL, explicit and implicit instruction, native input

1 Introduction

Much recent research in Second Language Acquisition (SLA) concurs in acknowledging some attention to form as necessary in the language acquisition process (DeKeyser and Prieto Botana 2014, Lightbown 2000; Radwan 2005). A case in favour of instruction is also often made by many SLA researchers (Doughty 2003;

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Tamenga-Helmantel, Arends and Canrinus 2014). However, research still has to unravel whether different types of attention-drawing instruction types, namely explicit and implicit, affect the language learning process differently. Traditionally, research on the impact of different instruction regimes has focused on morphological and syntactic aspects. The meta-analyses that have been conducted have reached conclusions such as (i) second language (L2) instruction being durable (Norris and Ortega 2000); (ii) Form-Focused Instruction being "facilitative and even necessary for developing implicit L2 knowledge" (Ellis 2002: 223), and (iii) Explicit Instruction exhibiting larger effect sizes than implicit instruction for simple and complex English grammatical structures (Spada and Tomita 2010). However, there is little empirical evidence on how implicit and explicit instruction approaches interact with second language phonological learning (Benson and García Mayo 2008; Saito 2012). L2 sound acquisition research, however, has produced interesting outcomes on the impact of intervention showing that laboratory-based training can help develop non-native phonetic contrasts (Bradlow 2008). This research has traditionally been carried almost exclusively in laboratory settings (Lee and Lyster 2015), leaving the reality of the classroom rather unexplored (Gómez Lacabex and Gallardo-del-Puerto 2014). Recently developed teaching-learning settings such as CLIL (*Content and Language Integrated Learning*) may become a suitable context so as to explore how foreign language (FL) learners may take advantage of different instruction processes, as these are learning contexts in which both instruction type and input can be maximised. The scarce research carried out on pronunciation outcomes in CLIL has indicated that this language component does not benefit from this teaching approach as much as other aspects such as reading skills or receptive vocabulary (Dalton-Puffer 2008; Ruiz De Zarobe 2015; Rallo Fabra and Jacob 2015).

Our work seeks to determine whether 14 year-old CLIL learners exhibit proceduralized awareness (Kivistö-De Souza 2015) of the phonological process of vowel reduction in unstressed syllables of content words (*bac<u>o</u>n*) in English, tested in a perception task in which they showed sensitivity (correct vs. incorrect) towards correct reduced vowels and incorrect full vowels before and after three different instruction types. While Gómez Lacabex (2009) found that EFL learners of a similar age lacked this phonological knowledge, the present study sought to explore whether such a phonological pattern would be boosted in a CLIL setting, which facilitated the alumni with more communicatively-oriented input. A first testing phase revealed that this was not so. In consequence, a similar explicit phonetic training procedure to the one developed in Gómez Lacabex & Gallardo-del-Puerto (2014) was administered to two experimental groups. Along with this, a third group which did not receive phonetic training in the classroom but was exposed to vowel reduction in the accent of an English and Science native teacher was also tracked so

as to gauge the impact of both explicit intervention and implicit exposure to native input on a discrete pronunciation aspect: English vowel reduction in lexical words. These groups' performance was ultimately compared to a control group without phonetic treatment or exposure to native input.

2 Literature review

2.1 Intuitive-implicit and analytic-explicit instruction

Much research on instruction in language acquisition has concentrated on elucidating the effects of different types of intervention strategies (Doughty 2003). Amongst the types that have been described and analysed, we find strategies which promote intuitive-implicit processing, which rely on the learner's capacity to notice and generate linguistic knowledge unconsciously, and strategies which activate analytic-explicit processing, which describe how the learner is fed and develops conscious linguistic knowledge. This distinction stems from the observation of first and second language acquisition processes. Children develop proficient language skills which they cannot metalinguistically explain, while adult language learners tend to incorporate/demand rule-led conscious processing. While, at first, these two language processing mechanisms were believed to be separate (Krashen 1982) and have been shown to be stored in different areas of the brain (Ellis 2008), we seem to be able to integrate them in the learning/acquisition process. Several recent proposals have argued that they interrelate, often explaining that explicit knowledge may be functioning as a facilitator for implicit knowledge (Ellis 1993), or that explicit knowledge can convert into implicit knowledge via communicative-oriented practice (DeKeyser 1998). Along these lines, Schmidt (1990) has also argued that explicit knowledge can facilitate a 'noticing' stage at which learners attend to the linguistic form and via subsequent awareness and practice phases (Lyster 2007; DeKeyser 2007) they can exhibit that they have internalized new language.

Notwithstanding that both explicit and implicit approaches seem to be effective in provoking gains (Tammenga-Helmantel et al. 2014; Saito 2013), comparative research on these intervention methods seem to point at the advantage of explicit instruction over implicit attention on grammatical knowledge (De Graaff and Housen 2009; Spada and Tomita 2010). As for phonological knowledge, the arena seems rather unexplored. Kivistö-De Souza (2015) has recently acknowledged this gap and has investigated L2 learners' proceduralized phonological awareness, that is, the ability of L2 learners to notice and interpret phonological cues implicitly, without the need to explain or verbalize. While the study concluded that such

ability is related to language proficiency, interestingly, it also revealed a correlation with L2 pronunciation proficiency, suggesting that phonological awareness may favour the development of pronunciation skills in the L2.

2.2 Intervention and L2 phonetic-phonological development

Despite the well-acknowledged claim that L2 phonological acquisition can be an arduous job for learners and often exhibits meager outcomes, intervention research (old and new) seems to indicate that much is still to be looked into. Traditional laboratory phonetic training studies long ago concluded that phonetic sensitivity towards the sounds of the L2 is not lost and can be tuned in adulthood (Logan et al. 1991; Jamieson and Morosan 1986, Strange and Dittmann 1984). After a rather dormant period in linguistic research, a recent renewed interest in pronunciation instruction evinces that pronunciation intervention produces improvement in the aural-oral interlanguage of L2 learners (Derwing and Munro 2015). As in the case of research on the impact of instruction on grammatical aspects, the training studies which acknowledge a boosting effect of phonetic intervention have traditionally focused on training and testing discrete and single features, such as vowels (Wang and Munro 2004; Iverson et al. 2012), consonants (Bradlow et al. 1997) or intonational patterns (Hardison 2004; Leather 1996), with 'guided' and discrete training and testing regimes such as imitation and reading aloud tasks for production skills and discrimination and identification tasks for perceptual skills.

The connection between L2 speech perception and production has also been investigated in phonetic training studies. The literature has produced evidence of perception-based training studies showing positive effects on production (see meta study by Sakai & Moorman 2018). Studies have also shown positive production-based training effects on perception (Hazan and Sennema 2007, Mathews 1997). Also, those few studies which have analyzed cross-modal training effects of perception and production skills have found a mutually facilitative relationship, although not always fully aligned, between perception-based training/outcomes and production-based training/outcomes (Catford and Pisoni 1970, Gómez Lacabex & Gallardo-del-Puerto 2014, Leather 1990).

2.3 Vowel reduction in English and Spanish

Sound acquisition research has attempted to account for vowel reduction from both a phonetic and a phonological perspective (Fourakis 1991; Barnes 2006). Among the phonetic accounts, this phenomenon has been described as vowels

loosing acoustic, durational and intensity traits (Lindblom 1963; Harris 2005) on account of aspects such as unstress, frequency of occurrence, speech style or inter/intraspeaker variability among others (Clopper and Pierrehumbert 2008; Kul 2010). A phonological account of vowel reduction has aimed at describing how in some languages vowels in unstressed syllables undergo a neutralising process by which they lose phonological contrasts (Barnes 2006; Jaworski 2010).

Vowel reduction processes in English are powerful and both phonetic and phonological vowel reduction have been described to be operating in this language. In addition, manuals on the description of the vowel sound system of the language traditionally include the non-stressed half open, half close unrounded vowel or *schwa* as a vowel phoneme (Cruttenden 2014; Davenport and Hannahs 2013).

Vowel reduction processes in Spanish have traditionally been described as simple. Authors such as Delattre (1969) described slight centring movements of vowels in unstressed positions while Quilis and Fernández (1996) explain that those centring vowels may be found in utterance final position only. Navarro Tomás (1918) also claims that central vowels such as *schwa* are not characteristic of the Spanish sound system. These rather "impressionistic accounts" (Ronquest 2013: 157) of a somehow shy phonetic vowel reduction phenomenon in Spanish have recently been made more precise by studies which have concluded that there is considerable variability in the degree of phonetic vowel reduction in Spanish (Cobb and Simonet 2015), which ranges from *schwa*-like production of unstressed 'e' vowels (Jaworski 2008) to vowel devoicing and lenition processes in south American Spanish dialects (Delforge 2008). Still, Spanish speakers are not used to attending to English vowel reduction phonemically (*Lenin* vs. *Lennon*) (Gómez Lacabex et al. 2008) nor do they tend to incorporate reduced vowels in their interlanguage (Flege and Bohn 1989; Ikeno et al. 2003; Rallo Fabra 2015).

2.4 Pronunciation outcomes in CLIL

While discrete testing on pronunciation outcomes in CLIL learning environments awaits to be performed (with the exception of Rallo Fabra and Jacob 2015), research carried out so far on the impact of CLIL on L2 pronunciation has mainly used holistic measurements and has produced mixed results regarding the superiority of CLIL students over traditional EFL students. While studies like Ruiz De Zarobe (2008) and Pérez Cañado (2018) have revealed that the CLIL students outscored the EFL students in pronunciation, Gallardo-del-Puerto & Gómez Lacabex (2013) and Gallardo-del-Puerto & Gómez Lacabex (2017) did not find a CLIL advantage. In

other studies the pronunciation component intermixes with other oral skills in variables such as 'overall oral proficiency', as in Admiraal et al. (2006), or 'speaking', as in Lasagabaster (2008). Productions have also been measured in terms of Degree of Foreign Accent in these contexts. Gallardo-del-Puerto et al. (2009) found out that while the CLIL secondary (aged 14–16) students' oral production was judged to be more intelligible and less irritating than that of the peer students receiving a traditional EFL approach, no differences in terms of degree of foreign accent between the groups were discovered. In the same vein, Rallo Fabra and Juan Garau (2010) explored intelligibility and accentedness longitudinally after one year in a group of secondary students (aged 13–14). They found that the CLIL students were more intelligible than the FL ones but differences in accentedness were slight. Interestingly, no differences between the two testing times were found in the CLIL group. The authors argued that one year of CLIL instruction may not be sufficient to improve aspects such as intelligibility or accentedness. Finally, in a more qualitative study on fluency and number of vowel errors, Rallo Fabra and Jacob (2015) examined pronunciation outcomes in 14–15 year-old CLIL and EFL learners longitudinally. They used quantitative variables which measured number of syllables, pauses and lengths of pauses, and also reported accuracy of vowel productions auditorily coded by a native speaker. They did not find significant differences in the fluency of a story-telling task or in the rate of vowel errors in a read-aloud task between the groups. More precisely, both groups improved in their fluency rates to a similar extent, while they did not experience amelioration in the quality of their vowels after two years of CLIL instruction.

In short, research on pronunciation gains in CLIL settings awaits to be conducted using more qualitative and discrete pattern testing so as to unravel whether the pronunciation aspect is un/likely to improve in such language learning contexts.

3 The present study

3.1 Research questions

The present study aims at exploring the degree of phonological awareness on the occurrence of English vowel reduction in unstressed syllables of content words by young learners enrolled in a CLIL programme before and after the delivery of classroom instruction in the form of either explicit phonetic training

or implicit exposure to native input. The following research questions are addressed:

3.1.1 Do CLIL learners exhibit awareness of English vowel reduction prior to instruction delivery?

Previous work has found that EFL learners of a similar age and linguistic background are not consistent at perceptually identifying a reduced vowel at syllable or word level, nor do they regularly produce reduced vowels (Gómez Lacabex 2009). This study seeks to explore whether being enrolled in a CLIL programme, namely, having had more exposure to the language and to communicative-oriented input would boost such phonological knowledge in the learner's interlanguage not having previously displayed any explicit/implicit attention towards it. Hence, CLIL learners' ability to identify both accurate *schwas* and inaccurate full vowels in unstressed syllables will be analysed before the awareness intervention.

3.1.2 Does CLIL learners' awareness of English vowel reduction improve after explicit phonetic intervention or implicit exposure to native input?

In line with the considerable robust evidence for the fact that both explicit and implicit instruction delivery provoke linguistic gains (see Sections 1.1. and 1.2), we expect that the learners in the experimental groups after explicit or implicit intervention will be able to identify English vowel reduction more accurately than the control group. To do so, we will explore time effects by comparing data from two testing times: before and after intervention for the four groups selected.

3.1.3 Do explicit phonetic instruction and implicit exposure to native input affect CLIL learners' phonological awareness of English vowel reduction differently?

Research evidence seems to suggest that explicit instruction programmes can boost grammatical knowledge in a more significant manner than implicit instruction procedures (see Section 1.1). We predict that the same case may be operating in the case of phonological knowledge. So as to verify this, we will compare potential time effects among the four groups in pair-wise analyses.

3.2 Materials and methods

3.2.1 Participants

A total number of 100 Basque/Spanish 12 year-olds (6th graders) learning English as a FL participated in the study. They belonged to four intact classroom groups of 25 students each, in the same grade at the same school. All four groups were enrolled in a CLIL programme which the school was running compulsorily for all learners and, consequently, all the groups had received the same amount of English exposure by the time of intervention. They had started learning 'English' at the age of 3 at school (3 hours/week) and began receiving additional 'Arts and Crafts' and 'Physical Education' lessons in English in 5th grade (11 years old). Besides, 'Science' was taught in English in each grade for one term only. The learners' proficiency in English was A2 level according to the Common European Framework of Reference (CEFR) (Council of Europe 2001). The teachers were non-native speakers of English with an advanced proficiency level, except for the Science and English teacher of the group receiving implicit intervention, who was a qualified native English speaker.

Three of these groups underwent different instruction modes to which they were randomly assigned: one group (*Explicit Pcp)* underwent explicit phonetic training based on discrimination and identification perception tasks with automatic feedback (see Table 1 for gender distribution). Another group (*Explicit Imit*) underwent explicit phonetic training based on listen-and-repeat practice with self-noticed feedback. A further *Implicit* group which was already receiving English lessons with the native teacher, started receiving Science lessons with the same instructor the term the intervention was conducted. The *Control* group received no explicit phonetic intervention and had no native input. However,

Table 1: Distribution of the sample into gender and intervention type.

Group	n.	Gender		Intervention type
		Male	Female	
Explicit pcp	25	10	15	Rule description and attention to form with perception practice
Explicit imit	25	8	17	Rule description and attention to form with imitation practice
Implicit	25	8	17	Native input
Control	25	9	16	On-line reading comprehension skills

and for ethical considerations, both the *Implicit* group and the *Control* group underwent an intervention period of the same length as the explicit phonetic intervention on strategy training for developing successful on-line reading comprehension skills. Both interventions were designed to integrate the use of the learners' individual laptops[1] in the experience.

3.2.2 Testing procedure

Before intervention, the learners were given a pre-test task which presented assorted words with a correct *schwa* (eg:/ə̲mend/) and with an incorrect full vowel (e. g.,/a̲mend/) randomly. Students had to judge words as correctly or incorrectly pronounced. The word was presented orthographically for each listening trial and the vowel in the unstressed syllable was underlined (*a̲mend*) as instructions explained that the potential incorrectness would always be in the underlined sound.

The words which were used to embed the correct *schwas* and incorrect full vowels were 50 English two-syllable words which included *schwa* orthographically represented with 5 vowel letters (*sala̲d, pilo̲t, cloven, basin, datum*) in pre-tonic (*a̲larm*) and post-tonic (*sala̲d*) unstressed positions. 34 items were chosen for post-tonic lexical *schwa* and 16 items for pre-tonic lexical *schwa*, as we respected a fairly 1 to 2 frequency of occurrence of each pattern in English. Three British, highly balanced English-Spanish bilinguals produced the English words eliciting them with a correct *schwa* and then mimicking typical Spanish-accented English pronunciation by trying to colour the *schwas* towards Spanish vowel qualities. They were supervised and supported by a phonetician, who was a native Spanish speaker and highly proficient in English.

Schwa-full vowel minimal pairs were created using PRAAT (Boersma and Weenink 2018) by splicing the mimicked Spanish full vowel and the *schwa* and pasting them to the same baseline for each informant's word. All audio sound files were normalised to the same Root Mean Squared (RMS) level. One of the voices (female) was chosen for the testing sessions and the other two speakers (one male and one female) were used in the training sessions to avoid speaker-specific adaptation in the post-test. The items were proportionally distributed into training sessions and testing/assessment tasks according to speaker voice (male/female), stress pattern (pre/post-tonic) and word familiarity (familiar vs. non-familiar words were identified by means of a questionnaire administered prior to pre-test).

1 The school was taking part in a Regional Project aimed at incorporating ICT in the educational system. The laptops were provided and maintained by the school.

3.2.3 Instruction procedure

Four training periods were programmed over consecutive weeks during the school's second term (March-April). Learners devoted around 30 minutes in four sessions to work on the phonetic training practice on their laptops in their English class once a week. The equipment was provided by the school and, hence, the laptops and accessories were the same for all students. The *Explicit pcp* phonetic training protocol was based on perception tasks of the type 'same/different discrimination' (two words are played in sequence and the learner must point out whether they hear the same word twice or two different words); 'oddity discrimination' (three words are presented in sequence and the learner must signal which of the three words is different from the other two) and 'correct/incorrect identification' (a word is presented and the learner must decide whether it is in/correctly pronounced). This practice provided automatic cumulative feedback (a star added every time a trial was correct in the first attempt). If the trial was incorrect, the sequence would play again until the students provided the right answer.

The *Explicit Imit* phonetic training regime was based on imitation practice. Students heard the orthographically signalled word on the screen via headphones and had to repeat it in a MATLAB interface, which recorded their productions. The programme forced them to listen to their own recording once and allowed them to try two more attempts if they were not satisfied with their productions.

All sessions were always supervised by an instructor and a technician, both of whom ensured that tasks were carried out conscientiously and that audio and microphone equipments were working.

The native teacher of the *Implicit* group was asked not to perform any explicit activity on vowel reduction in the 'English' sessions during the intervention weeks. It was this group's turn to receive 'Science' lessons in English, which they did from their English native teacher.

4 Results

Results will be displayed in accordance with the order in which the research questions were presented. Perception scores are presented as percent correct (% correct) for all groups. Variables were normally distributed and, hence, two-way ANOVA tests were conducted so as to look into the effect of intervention in Research Question 2. Bonferroni pair-wise comparisons explored post-hoc differences between the groups so as to look into possible differences between the instruction

types in Research Question 3. A further One-way ANOVA analysis for pre-test data across the four groups revealed no significant differences at the stage prior to intervention ($F(3,92) = 1.73$, $p = 0.167$), indicating that the groups were comparable.

4.1 Do CLIL learners exhibit awareness of English vowel reduction prior to instruction delivery?

The first research question sought to explore whether learners in a CLIL programme (and, hence, with more input than in traditional EFL instruction) would be able to perceptually signal vowel reduction in English unstressed syllables by identifying a *schwa* as correct and a full vowel as incorrect. Figure 1 displays a high percentage of reduced vowel identification as correct for all the groups (77.01 % on average) but a considerably lower correct response percentage when having to identify an inaccurate full vowel as incorrect (32.56 % on average), also read as granting an inaccurate full vowel in unstressed position as correct (67.44 % on average). This would indicate that the learners exhibited a bias towards 'correct' in pre-test phase evincing a possible lack of perceptual discrimination between the two vowels and/or the existence of both types of vowels (reduced and full) in unstressed position in their interlanguage.

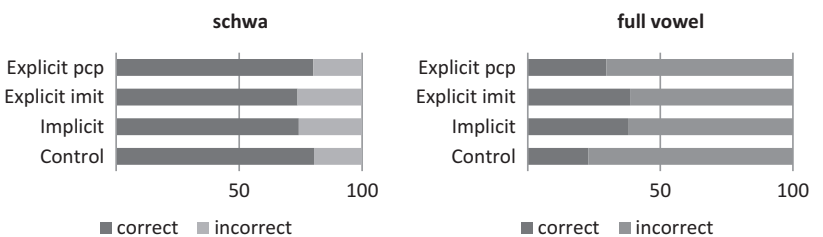

Figure 1: Left: Perception of accurate reduced vowel (e. g:/sæl̲əd/); Right: Perception of inaccurate full vowel (e. g:/sæl̲ad/) in pre-test for each group (*Explicit Pcp, Explicit Imit, Implicit* and *Control)*.

4.2 Does CLIL learners' awareness of English vowel reduction improve after explicit phonetic intervention or implicit exposure to native input?

As for the second research question, which aimed at looking into overall intervention effects, a two-way ANOVA, with group (*Explicit Pcp, Explicit Imit,*

Table 2: Correct % of perception, *standard deviations (SD)* in pre- and post-tests and gain values of accurate reduced vowel in unstressed syllable (e. g:/sælə̲d/) for experimental groups (*Explicit Pcp, Explicit Imit, Implicit*) and *Control* group.

Group	Pre-test % *(SD)*	Post-test % *(SD)*	Gain % (*SD*)
Experimentals:	76.05 *(13.31)*	78.43 (*11.72)*	2.38 *(11.33)*
Explicit pcp	80.16 *(10.75)*	80.79 (*12.65)*	0.63 *(12.0)*
Explicit imit	73.73 *(13.19)*	79.82 (*9.25)*	6.09 *(9.11)*
Implicit	74.26 *(16.00)*	74.69 (*13.26)*	0.43 *(12.2)*
Control	80.43 *(12.51)*	77.07 (*13.82)*	−3.36 *(13.36)*

*significantly different from *Control* at $p < 0.05$.

Implicit and *Control*) as a between-subjects factor and time (pre-test, post-test) as a within-subjects factor, comparing the identification of a spliced *schwa* as correct (see Table 2), revealed no significant group-by-time interaction, $F(3, 92) = 2.61$, $p = 0.056$, and no significant effect of time, $F(1, 92) = 0.62$, $p = 0.43$, or of group, $F(3, 92) = 1.25$, $p = 0.29$. Post-hoc pair-wise analyses did not reveal significant differences between the groups. Given the high means observed in pre-test, these results hint at a possible ceiling effect. A further one-way ANOVA test indicated that the groups did not show significant gains over time ($F(3, 92) = 2.61$, $p = 0.56$).

Table 3 displays percent correct values, *standard deviations (SD)* and gain values for the identification of an inaccurate full vowel in unstressed syllable as incorrect before and after training. The two-way ANOVA, with group (*Explicit Pcp*, *Explicit Imit*, *Implicit* and *Control*) as a between-subjects factor and time

Table 3: Correct % of perception, *standard deviations (SD)* and gain values of inaccurate full vowel in unstressed syllable (e. g:/sælad̲/) in pre- and post-test for experimental groups (*Explicit Pcp, Explicit Imit, Implicit*) and *Control* group.

Group	Pre-test % *(SD)*	Post-test % *(SD)*	Gain % *(SD)*
Experimentals:	35.34 (*16.22)*	56.62 (*20.61)*	21.28 *(22.58)*
Explicit pcp	29.62 (*14.75)*	66.39 (*20.91)**	36.77 *(23.42)**
Explicit imit	38.60 (*17.59)*	59.30 (*23.50)**	20.70 *(21.68)**
Implicit	37.82 (*16.33)*	44.17 (*17.42)**	6.35 *(9.09)*
Control	22.92 (*13.72)*	22.62 (*16.72)*	−0.30 *(13.37)*

*significantly different from *Control* at $p < 0.05$.

(pre-test, post-test) as a within-subjects factor revealed a significant group-by-time interaction, $F(3, 92) = 19.74$, $p = 0.000$, with a significant effect of time, $F(1, 92) = 74.95$, $p = 0.000$, and of group, $F(3, 92) = 13.87$, $p = 0.000$. This suggests that there was a training effect since intervened groups underwent considerable improvement, as the gain figure for *Experimentals* shows: 21.28 %, while the control group underwent some slight decay in performance. The post-hoc pairwise test (Bonferroni) showed significant differences between experimental groups and the *Control* group in all cases (*Explicit pcp* vs. *Control:* $p = 0.000$; *Explicit Imit* vs *Control:* $p = 0.000$; *Implicit vs. Control:* $p = 0.000$). A further one-way ANOVA test indicated that the experimental groups showed significant gains over time ($F(3, 92) = 19.74$, $p = 0.000$).

4.3 Do explicit phonetic instruction and implicit exposure to native input affect CLIL learners' phonological awareness of English vowel reduction differently?

Research question 3 sought to ascertain differences between training interventions. In the case of perception of an accurate reduced vowel (Figure 2), and despite the fact that it can be observed that the *Explicit Imit* group underwent

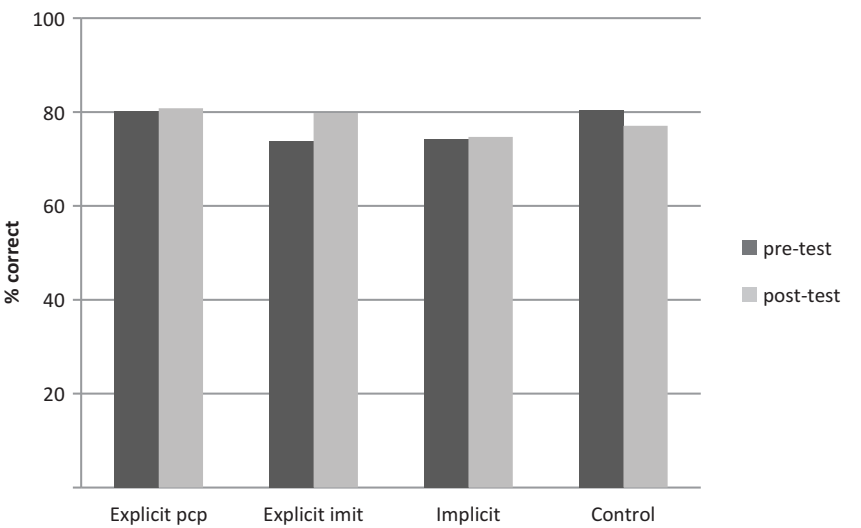

Figure 2: Correct % of perception of accurate reduced vowel in unstressed syllable /sæl̲əd/ in pre-test and post-test for all the groups.

more improvement than the other experimental groups and that the *Control* group deteriorated its performance, the post-hoc pair-wise test (Bonferroni) showed no significant differences between experimental groups (*Explicit pcp* vs. *Explicit Imit:* $p = 1.00$; *Explicit pcp* vs. *Implicit:* $p = 0.41$; *Explicit Imit* vs. *Implicit:* $p = 1.00$) in any case.

As for the identification of an inaccurate full vowel (Figure 3), the tests of interaction effects (Bonferroni) showed significant differences between the *Explicit pcp* and the *Control* groups ($p = 0.000$), between the *Explicit Imit* and the *Control* groups ($p = 0.000$) and between the *Implicit* and *Control* groups ($p = 0.001$), indicating that the three experimental groups benefited from their training experiences and that they behaved differently from the control group, which did not improve from pre-test to post-test. In addition, when gain scores were explored, pair-wise comparisons revealed significant differences among groups. *Experimental pcp* gained significantly more that the rest of the groups (*Explicit pcp* vs. *Explicit imit:* $p = 0.014$; *Explicit pcp* vc. *Implicit:* $p = 0.000$); *Explicit pcp* vs *Control:* $p = 0.000$). The same was found for the *Explicit imit* group (*Explicit imit* vs. *Implicit:* $p = 0.035$; *Explicit imit* vs. *Control:* $p = 0.001$). Finally, the *Implicit* group's gain was significantly lower than that of the other two experimental groups, as seen in the previous lines, but did not significantly distance from that of the Control group's (*Implicit* vs *Control:* $p = 1.000$).

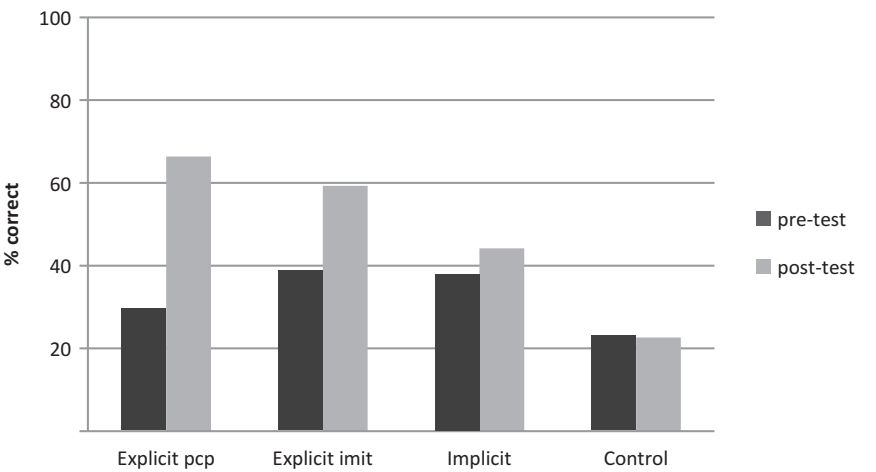

Figure 3: Correct % of perception of inaccurate full vowel in unstressed syllable /sælad/ in pre-test and post-test for all the groups.

5 Discussion

In the present study, young CLIL learners in Spain were tested on their ability to identify English disyllabic lexical words (e. g: *pilot*) with a reduced vowel as correct and with a full vowel in the unstressed syllable as incorrect before and after explicit and/or implicit instruction. Our first research question examined whether such learners would exhibit awareness of English vowel reduction prior to intervention, given that in CLIL programmes they have more exposure to the foreign language and to communicative-oriented input than in regular EFL regimes. The correct/incorrect perceptual identification task revealed that the learners tended to identify a word with *schwa* as correct 77 % of the time and also to identify a word with a full vowel as correct 67 % of the time. Results indicated that the learners judged both accurate reduced vowels and inaccurate full vowels as correct in unstressed position prior to intervention, exhibiting a lack of awareness of the occurrence of weak vowels in unstressed syllables in English lexical words and showing that both a full vowel and a *schwa* could be present in their interlanguage for this position. We would like to highlight that an alternative interpretation of this bias towards correct response for both vowel qualities could be grounded on a lack of perceptual discrimination between a full vowel and a *schwa* in unstressed position. Undoubtedly, the auditory discriminability of a reduced vowel and a full vowel in such phonetic context may be compromised in natural speech conditions. However, for the purpose of the present experiment design, we attempted at avoiding it by selecting acoustically identifiable full vowels uttered in unstressed position during the splicing phase. In addition, previous work with a similar phonological focus has shown that learners with a similar age are able perceptually discriminate this type of reduced-full vowel pairs (Gómez Lacabex 2009) but lack a phonological representation for them, as they are not able to associate the reduced vowels with the correct unstressed phonetic contexts (Gómez Lacabex 2009; Gómez Lacabex and Gallardo-del-Puerto 2014).

Hence, our results seem to point at the lack of assistance of increased exposure to communicative-oriented input, namely CLIL, on the development of phonological knowledge (Rallo Fabra and Jacob 2015). It has been for long acknowledged that pronunciation is unlikely to ameliorate in formal learning scenarios unless more dedication is devoted to it (Leather 1983; Pennington and Richards 1986; Rallo Fabra and Garau 2010). Reasons such as attention to pronunciation happening infrequently, practitioners not usually being native speakers and/or feeling unprepared to deal with it in the classroom and a dominance of the written form over the oral form have often been alleged. First, the lack of integration of the pronunciation aspect in the FL

classroom (Derwing and Munro 2015; Setter 2008; Szpyra-Kozłowska 2015) may be associated with testing demands when the tests do not incorporate the target aspect (so called 'washback' effect). In Spain, recent assessment modifications have appealed to include a foreign language test on written (reading, writing) and oral skills (listening and speaking) in primary and secondary education (Organic Law 8/9 December 2013th (LOMCE), which modifies the Organic Law 2/3 May 2006rd (LOE), and to add an oral skills test to the written one for university entrance examinations (Royal Decree 1892/2008). However, not all communities have incorporated this testing system yet and among those which have, the oral expression test was administered in very few Spanish communities. Secondly, language and content instructors often feel uncertain about dealing with pronunciation, very often being the case that they simply have not received enough/any training on how to approach it in the classroom (Henderson et al. 2012). Along with this, tandem teaching, that is, a close collaboration of the content teacher along with the language teacher when planning goals and practices has been suggested to be a must in the successful development of CLIL methodologies (Pavón and Ellison 2013). However, this is still not found as common practice as it is well acknowledged that content teaching has at times been incorporated rather precipitously in many educational institutions. Under such collaboration, the language teacher may be in a position to support the content teacher and vice-versa by developing learning strategies which can help learners genuinely progress both in the language and the new content material and not neglecting language aspects such as pronunciation. Thirdly, materials presentation in CLIL lessons is often exploited in the written form as in reading texts, web-pages or blogs, while audio-visual materials such as conferences, videos, podcasts, etc., may be less resourced by teachers (Oddone 2011). As a consequence, learners are likely to become accustomed to relying on visual language prompts (orthography, images or pictures) rather than on audio/visual language presentation. In the case of Spanish learners, this can provoke that orthography becomes a prevalent agent in their production, likely to positively affect their written output, but negatively intervene in their oral one (Rafat 2013). As a matter of fact, the effect of orthography may be playing a role in the case of *schwa* identification, given that this phonetic segment can be represented by multiple graphemes; the present study included items with five vowel grapheme representations (*cloven, raisin, bacon, album, ago*).

As for the effect of the intervention proposed in our second research question (*does CLIL learners' awareness of English vowel reduction improve after explicit phonetic intervention or implicit exposure to native input?*), results revealed that the three experimental groups did not significantly improve in

identifying a word with *schwa* as correct but did significantly improve in identifying a word with a full vowel as incorrect after intervention. The lack of improvement in identifying a word with a *schwa* as correct in post-test is likely to be revealing a ceiling effect. It may be that the learners do require further perceptual training with more specific acoustic or durational cues to help them identify such a vowel quality more effectively. It was found that the learners in the three experimental groups experienced gains in their ability to judge a full vowel in unstressed position as incorrect after the instruction period whereas the control group did not undergo this improvement in their phonological awareness showing that several types of instruction may be able to assist learners in their phonological development of the L2. In line with previous research (Tammenga-Helmantel et al. 2014; Saito 2013), both explicit (in the form of phonetic training based on perception skills and on production skills) and implicit intervention contributed to gains, acknowledging the impact of instruction on phonological learning (Benson and García Mayo 2008). In addition, we shall also highlight that both training regimes included conditions which have been reported to facilitate learning such as repetition (Trofimovich and Gatbonton 2006) and cumulative and qualitative feedback (Hansen 2006) in the case of the explicit group undergoing perception-based training, and recasts of self-performance (Lyster 2001) in the case of the explicit group undergoing production-based training. These findings also acquaint the relevant role of feedback in second language pronunciation instruction.

With regards to the third research question (*do explicit phonetic instruction and implicit exposure to native input affect CLIL learners' phonological awareness of English vowel reduction differently?*), the pair-wise comparison analyses for the two-way ANOVA tests carried out (group and time effects) did not show significant differences among the experimental groups in the correct *schwa* corpus. Nor did the one-way ANOVA test for gain scores. That is, groups did not differ in their performance concerning the perception of a reduced vowel in unstressed position before or after the intervention period, which was rated as correct at around 70 % regardless of the testing time and the intervention type administered. In the case of the corpus which showed significant intervention effects, the identification of a full vowel as incorrect in post-test, it was observed that the groups in the explicit phonetic training condition with perception practice underwent more gains than the group in the explicit phonetic training condition with production practice, which in turn, exhibited more gains than the group in the implicit instruction condition with native input. The one-way ANOVA test, which explored differences between gain scores among all the groups, revealed that these differences were significant. In line with what instruction literature on other language aspects has acknowledged (De Graaff and Housen 2009; Spada

and Tomita 2010), our phonetic data would seem to point that an explicit instruction combined with a same discrete test-task approach (the case of the group having received explicit phonetic training and identification tasks in the present study) is likely to impact the learners' phonological performance more strikingly than an explicit type of instruction which deviates in test-task approach (the case of the group having received explicit phonetic training and listen-and-repeat-tasks in the present study). More interestingly, these two explicit intervention types still produced more improvement than the implicit intervention with native input. Still, this group's improvement was, although considerably smaller than the one observed in the other groups, significant. This suggests that even when accurate input is accessible, as the group had had the native teacher as their English instructor for the first course term, pronunciation improvement may not develop as much as when explicit instruction is provided. In addition, the incorporation of a noticing/awareness stage (Schmidt 1990; Lyster 2007), in the form of a pre-test for this group, seemed to have triggered some un/conscious attention to the targeted forms, which resulted in an improvement in their phonological awareness of English weak forms after a relatively short time period: four weeks. Interestingly, the introduction of such pre-test noticing phase for the Control group did not provoke gains, indicating that both a noticing phase (Schmidt 1990) and exposure to accurate input (Flege 1991) were sufficient to boost learners' phonological awareness of vowel reduction occurrence in English unstressed syllables. The relevance of accurate phonological input in the learning process has been acknowledged in theories such as the *Speech Learning Model* (1991) with the 'accented L2 input Hypothesis', which states that learners will fail to perceive and produce sounds accurately if they are not provided with adequate L2 phonetic input, regardless of their starting age of learning (Flege and Eefting 1987, 1988). The present study evinces that in a formal leaning scenario, access to accurate/authentic input and noticing positively interact in the learner's phonological awareness when both factors are incorporated in the students' learning experience.

The present study is not without limitations. As Doughty (2003) has pointed out, the claims supporting the advantageous condition of L2 instruction still need to be sustained in research which incorporates testing language performance in spontaneous conditions. Gains in such speech domain would translate into a more phonological competence domain, at which the learner would be able to exhibit that the phonetic category which s/he has learnt to perceive and/or produce is associated with more abstract and mental phonological knowledge. Such competence domain is representative of the internalized acquisition stage in which the phonological information is always drawn upon whenever needed in speech and which exhibits in unguided performance tasks such as

free or spontaneous speech (Saito 2013). Our study examined the development of L2 phonological awareness perceptually. Further exploration of guided and unguided production of vowel reduction awaits to be performed so as to provide a more exhaustive explanation of the development of phonological knowledge and the impact of intervention in these learners' interlanguage.

6 Conclusions

Our study aimed at examining the development of phonological awareness on the occurrence of vowel reduction in English unstressed syllables in content-based instruction (CLIL) in Spain. The study observed that CLIL learners do not exhibit such awareness and explored whether the delivery of three different instruction types, namely explicit perception, explicit production and implicit exposure to native input, would raise it. Explicit instruction was delivered in the form of perceptual discrimination and identification practice and in the form of listen-and-repeat practice on the reduced/full vowel contrast. These two regimes were compared to a group which received exposure to native input. Learners in the three experimental groups improved their identification of a full vowel as incorrect after intervention, an improvement not shown by the control group, evincing that both explicit and implicit learning can boost phonological awareness. It was observed that the groups undergoing explicit training underwent greater improvement than the group undergoing implicit exposure to native input. Factors such as the existence of a noticing stage, access to native input or type of feedback were discussed to understand the digression between explicit and implicit instruction observed in intervention forms displayed in the present study.

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