

Does 'Notice' Prompt Noticing? Raising Awareness in Language Learning with an Open Learner Model

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Abstract. Open learner models (OLM) are learner models that are accessible to the learner they represent. Many examples now exist, often with the aim of prompting learner reflection on their knowledge. In language learning, this relates to research on noticing and awareness-raising. We here introduce an open learner model to investigate the potential of OLMs to facilitate noticing. Results suggest that an OLM could be a useful way of helping students to notice language features, with all students noticing some of the features tested, a result that was maintained in a delayed post-test one week after the experimental session.

1 Introduction

Traditional approaches to learner modelling keep the learner model internal to the adaptive environment, invisible to the learner, as its purpose is to allow the system to adapt to the learner's needs. The desire to facilitate reflection on learning and raise learner awareness of their knowledge has prompted some researchers to make the learner model visible to learners: hence the development of open learner models (OLM), e.g. [1], [2], [3], [4], [5].

In language learning, reflection and awareness-raising could be likened to 'noticing' [6]. An important function of awareness-raising is to help learners 'notice the language feature' [6] and 'notice the gap' between their own production and the correct grammatical feature as produced by native speakers [7]. For example, in the input (i.e. the language available to learners) "*she bought two loaves of bread*", the target word is 'loaves'. Learners may note the correct form of 'loaves' and compare it to their own form 'loafs'. They see that 'f' is replaced by 'ves', and may realise the grammar rule (which is: *to get a plural form from a singular countable noun ending in 'f', one has to change 'f' into 'v' and add 'es'*). Such noticing can enable learners to integrate a rule into their language system. Raising awareness of language features, or noticing items available in the input, may help direct learner attention to these features [6], [8] (see also [9] for a recent overview on language awareness); and increasing the saliency of target items has been recommended for computer-assisted language learning [10].

This paper investigates the potential for prompting noticing in language learning using an OLM. We consider both noticing language features and noticing the distance between one's own language and the native speaker language. The specific example

for this study is English as a Second or Other Language (ESOL), focusing on irregular verbs and irregular plural nouns as these are amongst the grammatical morphemes commonly overgeneralised by learners [11].

2 The Notice Open Learner Model

Mackey and Abbuhl [12] prompt us to use a salience technique in the OLM to: help learners notice a grammar feature; compare their production with awareness-raising examples, which in this context are native speaker productions; and motivate them to self-repair instead of the system providing direct error correction (by showing learners representations of their knowledge and difficulties). 'Notice', an OLM for language learning, was developed to investigate whether students might immediately notice highlighted features presented in an OLM, and whether there may be retained noticing, measured in a delayed post-test. Notice aims to facilitate acquisition of irregular language forms, and reduce the occurrence of irregular verb and irregular plural noun overgeneralisation-related errors. It provides examples using a salience technique of highlighting the clues which may draw the learner's attention to the target items.

The Notice OLM consists of three parts: the learner model which is built and updated dynamically from the learner's answers to questions; the native model which shows the domain knowledge (i.e. the correct target language); and the comparison model which is a combination of both learner model and native model. The learner model of Notice is therefore open to the learner to view information about their knowledge of the target domain to promote reflection and to help them notice the language features (see [6]). The compare model consists of both the learner model and the domain model to help learners notice the distance or 'gap' between their knowledge and the domain knowledge (see [7]).

For the purpose of this study, the learner modelling in Notice has been kept simple. Learner knowledge is modelled through multiple choice questions, with distracters designed to elicit common difficulties. For example, the belief that: *all verbs in the simple past end in 'd' or 'ed'* (note: know-knew, drive-drove, light-lit, send-sent, teach-taught, set-set (which could be classified into groups such as verbs having a medial long vowel, verbs that require no change in the past)); and *all plural nouns add 's' or 'es'* (note: leaf-leaves, sheep-sheep, information-information, hypothesis-hypotheses, tooth-teeth (which could be classified into groups such as nouns ending in 'f' or 'fe', nouns ending in 'is')). The learner's language features are modelled over the last five attempts at questions relating to that feature. If learners answer five questions correctly, their knowledge is identified as excellent. If they have four questions with one misconception or incorrect response, their knowledge will be identified as very good. If they get three or more questions right, their knowledge level will be good. If they answer three or more questions indicating a misconception, their knowledge will be identified as a misconception (and associated with the specific misconception). If they have three or more questions incorrect, their knowledge will be identified as limited. If they have only one or two correct answers with two incorrect or two misconceptions, their knowledge will be identified as very limited. Beyond the above, other possibilities are classified as insufficient data.

In the externalisation of the learner model, as also in some other OLMs (e.g. [2], [13], [14]), colour is used to depict the level of the learner's understanding. This is combined with text (e.g. 'very good' and information about a misconception); graphically as in small boxes or nodes in front of the title of topics; a large (red) text box which contains information about a misconception, and the background colour of small text boxes which contain the target words. These are shown in Figure 1 (LM Basic: Learner Model Basic) and Figure 2 (LM CR Sentences: Learner Model Consciousness-Raising Sentences).

<input type="checkbox"/>	Verbs ending in "d"	Your knowledge is: Good
<input type="checkbox"/>	Verbs having medial "t"	Your knowledge is: Very Good
<input type="checkbox"/>	Verbs miscellaneous	Your knowledge is: Very Good
<input type="button" value="More Detail"/>		<input type="button" value="Comparison"/>

Fig. 1. The Notice OLM (LM Basic)

<input type="checkbox"/>	Verbs having medial long vowels	Your knowledge is: Very Good
Example: Catherine (feel) felt sad when her father passed away.		
Example: Our company (deal) dealt with many European countries in 1999.		
Try: Sam (keep) keep his car in the garage .		
<input checked="" type="checkbox"/>	Verbs ending in "d"	Your knowledge is: Misconception
You may believe that you still need to add (d) or (ed) to make verbs in a simple past tense		
Example: When she went on holiday, she (lend) lent her car to her boyfriend.		
Example: Our neighbours (send) sent us welcome cards when we moved to our new house.		
Try: The government (build) build build/built/built new bungalows for the elderly .		

Fig. 2. The Notice OLM (LM CR Sentences)

The learner's knowledge of the simple past tense for *verbs having medial long vowels* in Figure 2 is modelled as 'very good'. This is stated both textually, and with the target words *felt* and *dealt* and the box in front of the title of the topic, in light green – the colour that represents very good knowledge. A misconception is shown for *verbs ending in 'd'* (that the regular form ('d' or 'ed') is added). Highlighting words is designed to draw the learner's attention to the correct form, as this technique makes the target forms more explicit to learners. The aim of having a sentence which a learner can try, as in the fourth and last line of Figure 2, is to stimulate the learner into

thinking about how the word should look in each form, and what rule should be followed to attain the relevant target form.

Of course, we are not claiming that if the learner reads the awareness raising sentences, they will necessarily notice the correct form. Instead, a new group of questions is provided after viewing the model, as in Figure 3, to identify whether there may have been any immediate noticing of forms. If a learner's knowledge of a certain feature improves after attempting these post model-viewing questions, we take this as an indication that some immediate noticing has occurred.

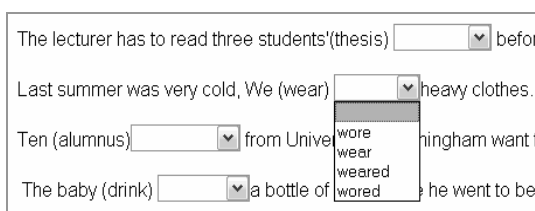


Fig. 3. Excerpt from questions to test for immediate noticing after viewing the learner model

The learner may choose to compare their model with the domain knowledge. Figure 4 shows the explicit comparison between the learner model and the domain, showing these side by side (LM Comparison: Learner Model Comparison).

The Learner Model	The System Model
<p>Plural Nouns</p> <p>[-] Nouns ending in "f" or "fe" Your knowledge is: Insufficient</p> <p>Example: My mother cuts the cake into two (half) halves and gives them to us.</p> <p>Example: My friend has bought a new set of (knife) knives.</p> <p>Try: They always have two (loaf) loaf for breakfast.</p> <p>[-] Nouns having special form Your knowledge is: Limited</p> <p>Example: Vegetarian people do not eat (swine) swine.</p> <p>Example: There were seven (sheep) sheep grazing in the green field.</p> <p>Try: My child was playing with two (deer) Deer /deeres/deers in the field.</p>	<p>Plural Nouns</p> <p>[+] Nouns ending in "f" or "fe"</p> <p>Example: My mother cuts the cake into two halves and gives them to us.</p> <p>Example: My friend has bought a new set of knives.</p> <p>Try: They always have two loaves for breakfast.</p> <p>[+] Nouns having special form</p> <p>Example: Vegetarian people do not eat swine.</p> <p>Example: There were seven sheep grazing in the green field.</p> <p>Try: My child was playing with two deer in the field.</p>

Fig. 4. Comparison of learner model and native (domain) model (LM Comparison)

Figure 4 shows the learner's (inaccurate) knowledge by providing examples of their (incorrect) beliefs written in the same colour that represents their knowledge of the topic (left and Figure 2). The domain model (the system/native model) contains information to draw the learner's attention not only to the target words, but also to the correct form of these words by emboldening them (right). The learner can compare very closely (on the same line) between their productions, whether correct or incorrect, and the domain model – in this case the correct words produced by a native speaker of the target language. If, after viewing LM Comparison, learners subsequently answer

questions correctly (see Figure 3), we can assume that they have learned from the comparison, and that they may immediately 'notice the gap' [7].

There is currently no agreement over how instruction may best facilitate language learning, the extent to which focus on form may be useful, or the importance of noticing (see [15]), and we do not wish to argue that Notice should necessarily be deployed in a generally form-focused instructional context. Nevertheless, some attention to language form is likely to be helpful [16], [17]. We investigate this in the following section.

As stated above, Notice was developed to observe whether learners may be prompted to notice language features in an OLM. It is here used together with a delayed post-test to investigate whether any immediate noticing may be retained.

3 Does Notice Facilitate Noticing?

In this section we investigate the following research questions using Notice:

1. Will participants understand the OLM views?
2. Will participants consider the OLM views to be accurate?
3. Will participants find the OLM views useful for their learning?
4. Will the salience technique help participants to 'notice' the correct form and 'notice the gap' between their knowledge and the domain knowledge?
5. Will any 'noticing' be maintained over time?

3.1 Participants, Materials and Methods

Participants were 30 students taking an ESOL course at a U.K. College of Further and Higher Education, at intermediate or higher intermediate level, who were aiming for a higher level certificate in English. Two sessions were arranged for each participant in small groups of seven to eight, scheduled during their usual laboratory time. In the first session participants interacted with the Notice system (unconstrained), and in the second session held one week later, they took a delayed post-test.

In the first session participants were given information about the system and instructions for the session. The experimenter was present to help participants with the log on process, to answer any questions about Notice, and to explain any unknown words in English. During the session, participants answered questions and viewed their learner model showing the basic information (LM Basic), the learner model containing the awareness or consciousness raising sentences (LM CR Sentences), and the learner model comparing the learner's knowledge and the native model (LM Comparison). All interactions were logged by the system to enable identification of the frequency of model inspection; the knowledge level each learner had during model inspection; whether a participant immediately noticed the correct form of the word after inspecting the LM (CR Sentences); and whether s/he noticed the gap between his/her own rules and the correct rules when inspecting the LM (Comparison). The initial state of the learner model (as soon as the learner had answered sufficient questions for the learner model to be constructed), and the final learner model states were used to identify learner knowledge at the beginning and the end of the session

(in place of a pre-test and post-test). The mid-point state of the learner model was used to identify learner knowledge in the middle of the session. At the end of the session a questionnaire was administered, with responses to statements required by circling one of the following: 'strongly disagree', 'disagree', 'neutral', 'agree' and 'strongly agree'. Here we combine the responses of 'strongly disagree' and 'disagree' as negative responses and 'strongly agree' and 'agree' as positive responses. The session was scheduled for one hour, but some students chose to continue interacting beyond this time.

The college lecturers refrained from teaching irregular verbs and irregular plural nouns until after a paper-based delayed post test one week later. 24 of the 30 participants took the post test containing fifty questions similar to the questions attempted during interaction with Notice. The session lasted for one hour (sufficient time for questions to be answered at participants' own pace), with the aim of determining whether the participants had retained the correct forms. In other words, to what extent they had or had not internalised the correct form into their language system one week after using Notice.

3.2 Results

In the questionnaire, participants rated whether they understood each view of the learner model, namely, LM Basic, LM CR Sentences and LM Comparison. As seen in Figure 5, most participants claimed to understand the learner model views, with a few responding neutrally to one or two views (different participants responded neutrally to different views, with only 2 participants responding neutrally to two views), and one responding negatively to one of the views (LM CR Sentences). Similarly, most participants agreed that the three views were accurate. Only 3 or 4 participants responded neutrally to one or two views, with different participants responding neutrally to different views. Only 2 participants responded neutrally to two views and 1 answered negatively about the accuracy of the LM Comparison view.

Figure 6 shows that most users claimed to find each of the views useful for identifying their knowledge (1), any general difficulties (2), and any misconceptions/overgeneralisations (3). They also rated the views as useful in general (4).

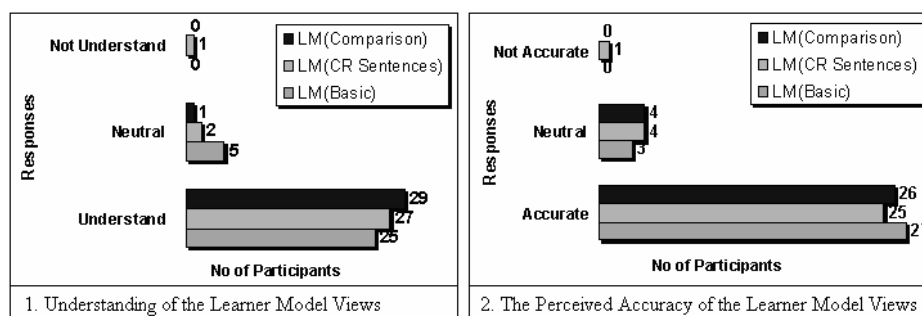


Fig. 5. Understanding and the perceived accuracy of the learner model views

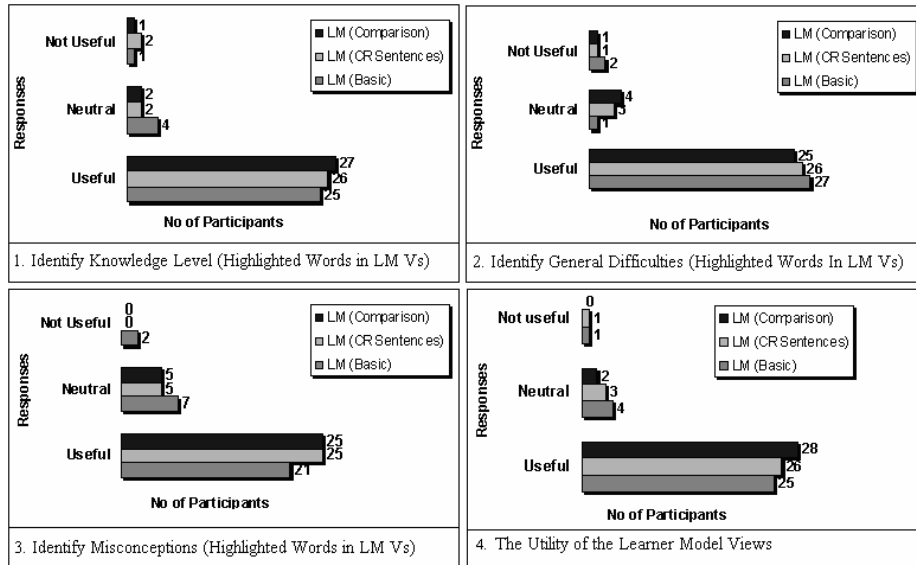


Fig. 6. Usefulness of the learner model views

The overall picture of the knowledge level averaged for all participants is given in Figure 7. 50% of the participants' initial LM was at a low level (either misconceptions or limited knowledge), and none was seen at the excellent level. In contrast, 90% of the final LM is identified at high levels (excellent, very good, or good), with progression throughout the session from initial to mid to final learner model. Although there was a decrease in excellent and very good levels identified in the post-test (one week after the final LM), this is still much higher than in the initial LM, and the differences between the final LM state and delayed post-test are small. All learners improved their knowledge between the initial LM and the delayed post-test.

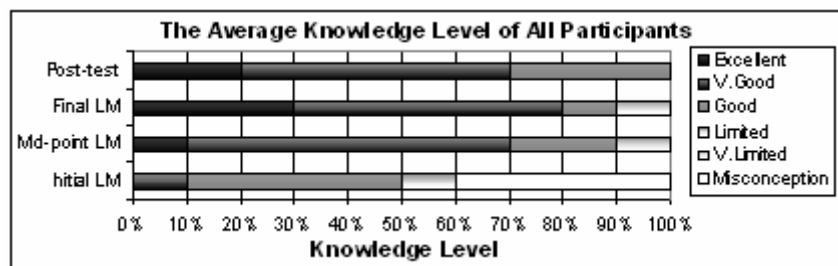


Fig. 7. Learner knowledge at initial, mid-point, final learner model state, and post-test

Figure 8 shows the average knowledge of each of the irregular plural noun and irregular verb features modelled, at the initial LM stage and the delayed post-test. For each, knowledge was greater in the delayed post-test than when students started using

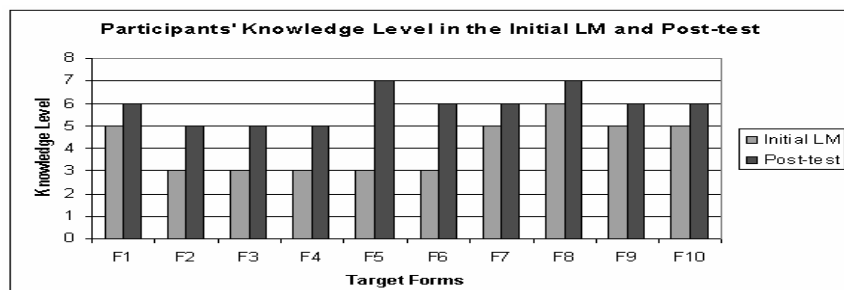


Fig. 8. Knowledge of each feature modelled at initial learner model and post-test

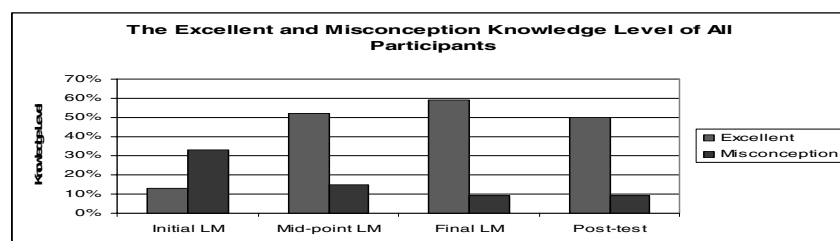


Fig. 9. Excellent (highest) level of knowledge and misconceptions at each stage

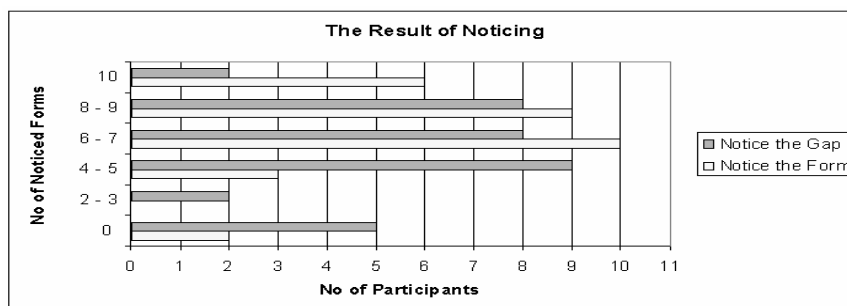


Fig. 10. Noticing the forms and noticing the gap

Notice. Increases were found in particular for Form 5 (miscellaneous nouns, e.g. mouse-mice, tooth-teeth) and Form 6 (unique verb forms, verbs not changing form, e.g. cut-cut). On average students improved their understanding of 6.5 features between the initial LM and the delayed post-test. Figure 9 demonstrates that as knowledge increased throughout the session, followed by a slight decrease at the delayed post-test stage, the misconceptions decreased.

Figure 10 shows the results for immediate noticing of language features and noticing the gap, revealed from students' answers to the test questions after accessing the LM CR Sentences and LM Comparison views (see Figure 3). This is averaged over

the whole session, and indicates that students were immediately noticing some of the forms as well as the gaps between their knowledge and the target features.

3.3 Discussion

This section discusses the results with reference to our research questions: Will participants understand the OLM views? Will they consider them accurate? Will they find them useful? Will they notice correct forms? Will they notice the 'gap'? Will any noticing still be evident one week later?

It is important to first identify whether students understand what the OLM views represent, as this is crucial for fostering noticing in this context. It is also important to ascertain whether students consider the views to be accurate, since this is likely to influence their motivation to pay attention to the representations. In both cases a large majority responded positively in the questionnaire for each of LM Basic, LM CR Sentences and LM Comparison: 25-29 of the 30 participants (Figure 5). Students also found the model views useful – both generally and specifically for identifying knowledge level, general difficulties and misconceptions (Figure 6). This is also important with reference to motivation to use Notice.

Overall there was a strong increase in knowledge level between the initial learner model state and the delayed post-test (Figures 7 and 9), and all learners improved their level of knowledge. The post-test results remained quite similar to the final learner model state, dipping only slightly. Furthermore, there was an increase in average knowledge level of all forms between initial state and delayed post-test (Figure 8). Thus we argue that forms can indeed be noticed through use of an OLM such as Notice. This is also shown in Figure 10 with reference to immediate noticing, where learners were observed to notice after using both the individual learner model and the comparison view. The extent to which noticed forms might be retained beyond one week is a question for further investigation. Of course, if instructors are also teaching the forms at the same time, heightening their salience, this retention may be more likely.

In summary: the results suggest that an awareness-raising technique used in an OLM may help language learners to notice target forms. This holds true not only immediately after inspecting the learner model, but in many cases also after one week with no further instruction on the forms. It seems, therefore, that learners may be able to internalise correct forms into their language system, using an OLM such as Notice. This type of OLM has already been found able to support independent learning in a range of university courses [2], and it now seems that the approach may be particularly relevant for reflecting on, or noticing language. Further work would therefore be useful. In particular, we would like to investigate students' noticing experiences *after* using an awareness-raising OLM. Were they more aware of noticing elements in the everyday language around them?

4 Summary

This paper has presented Notice, an OLM to prompt noticing in second language learning. It was found that using a saliency technique in the context of an OLM can help to prompt noticing of language elements (here irregular noun plurals and verbs), and this can be maintained over a one week period. Further investigation of the potential for OLMs to prompt noticing in language learning is recommended.

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