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Actualizing the affordances of Machine Translation Tools for language learning

Bio data



Antonie Alm (PhD, UCLA) is an Associate Professor at the University of Otago in New Zealand, where she teaches German language, Computer-assisted language learning and Intercultural Communication. Her current research explores informal engagement with language and the pedagogical use of machine translation in language education.

Abstract

This paper investigates the use of machine translation tools (MTT) for reflective language learning. Drawing on Bowker's (2020) concept of machine translation literacy, it suggests that machine translation tools can support learners in their language development if used critically. It argues that language learners should be supported to seek out affordances of MMT to develop machine translation literacies for specific language skills (reading, writing, listening and speaking) and vocabulary building. This paper presents the preliminary findings of a small-scale study involving ten advanced German language students who explored the features of MTT to meet their individual learning goals for reading. The process of affordance development was analyzed through the lens of Affordance-Actualization Theory.

Conference paper

Introduction

Driven by powerful AI, neural machine translation (NMT) is undoubtedly the smartest kid on the (CALL) block. It has been predicted that machine translation will be able to compete with human translation in the near future (Crossley, 2018). Recent studies indicate that the lexical and grammatical quality of NMT output already outperforms intermediate-level language learners (Lee, 2022). Freely available, online translators provide an impressive range of features, such as Google Translate's conversation mode, enabling people to have bilingual conversations, or its dictionary, which not only translates but also corrects input, as well as provides the option of saving words and phrases for later revision. Further, in addition to document translations, browser extensions translate webpages, making the translation process unnoticeable to the reader. The versatility of machine translation tools (MTT), such as Google Translate, DeepL or Reverso and their omnipresence in digital environments make machine translation an appealing resource for language learners. In fact, recent studies indicate that more than 90% of language students use MTT (Kok Wei, 2021). Survey studies show that students commonly use MTT to look up the meaning of words for reading, translate

texts, learn vocabulary, check grammar for writing and pronunciation of unfamiliar words (Briggs, 2018; Kok Wei, 2021; Nugraha et al., 2019). Concerned about the negative impact of MTT use on learning, many teachers ban or restrict their use (Grove & Mundt, 2021) or provide training to ensure that students learn to use them critically and appropriately (O'Neill, 2019).

Machine Translation Literacy

Bowker (2020), a translation scholar, uses the term *machine translation literacy* to emphasize that machine translation needs to be used skillfully in professional and academic contexts. As she put it, "using machine translation is easy. Using it critically requires thought" (p. 28). Critical use of machine translation requires translators to have an understanding of the functionalities of different online translators and their respective suitability for different tasks. Further, the use of machine translation needs to be transparent and acknowledged. The issue of academic integrity is one of the main concerns voiced by language educators who fear that students may present MT output as their own work (Grove & Mundt, 2021). However, recent studies, including Alm and Watanabe (2021), suggest that most language learners are well aware of the detrimental effect of machine translation on their learning if it is used for unreflective copy and paste translation rather than for reviewing their own texts written in the L2, or making stylistic improvements. Building on this study and the finding that many advanced and experienced learners use machine translation strategically to improve their writing, the current study explores in more detail the conditions under which learners seize the affordances of machine translation for language learning. Drawing on Affordance-Actualization Theory, it seeks to gain an understanding of the processes leading to machine translation literacy for language learning.

Affordance-Actualization Theory

Recently introduced to the area of CALL by Tanaka-Ellis (2022), Affordance-Actualization Theory was originally developed by Strong et al. (2014) in Information Systems to provide a framework for affordance actualization to explain the affordance potential of technologies in organizational contexts. The authors describe affordance as "the potential for behaviors associated with achieving an immediate concrete outcome and arising from the relation between an artifact and a goal-oriented actor or actors" (p. 70). With the term actualization, they refer to "the actions taken by actors as they take advantage of one or more affordances through their use of the technology to achieve immediate concrete outcomes in support of organizational goals" (p. 70).

Tanaka-Ellis (2022) has shown how Affordance-Actualization Theory can be used as an analytical tool in CALL contexts. She points out that unlike earlier views of affordance (e.g. Gibson, 1979; Van Lier, 2004), the model developed by Strong et al. (2014) focuses on the process of actualizing, providing insights into the affordance potential of a technology and its relevance for language learning. The model captures "affordances in transition" (p. 17) by identifying how people engage with a feature of a technology to meet a specific need. Using the terminology of Affordance-Actualization Theory, two elements, 1) the feature of the technology and 2) the characteristics of the actors (users), *give rise to an affordance*, described as *immediate concrete outcomes*. In Strong et al.'s (2014) model, these outcomes provide the organization with feedback on the affordance potential of a technology, which may or may not support the organizational goal. The level of actualization is reached when the actions align with goals of the organization. In an exploratory educational context, as presented in this paper, the feedback provided by learners on affordance potential can be used to inform educational goals. To explain, the actions taken by learners might not support language learning (e.g. use of MT to avoid cognitive engagement). However, they might confirm anticipated actions (e.g. use of MT to correct learners' L2 texts) or provide examples of affordance potential for learning that had not previously been identified (e.g. use of audio files to improve pronunciation). An analysis of affordance actualization of individual learners can

therefore help to establish a best practice repertoire to support machine literacy for specific language skills.

This study uses the model of affordance-actualization to analyze how language learners develop machine translation literacy in L2 reading. The larger project also covers L2 writing, listening, speaking, and vocabulary development, examining the interconnections between these affordances. The overarching research question is as follows:

To what extent can self-determined use of machine translation tools support the development of machine translation literacy in advanced language learners?

Method

Participants and task

The participants of this study were ten advanced German students who, after having set themselves learning goals aligned with the five competencies of the Common European Reference Framework, engaged in reading, viewing and listening of self-selected articles, videos, and podcasts from the political youth magazine *Fluter*. They reflected on their learning experiences and shared them with other class members in weekly blogs and Flipgrid videos over a period of six weeks. In their written reflections, students were asked to describe their strategic use of Google Translate and DeepL and their perceived benefits for their language development. In addition, they produced in pairs a repertoire of MTT practices for language learning.

Task design

The design of the learning environment is based on the principles of Self-Determination Theory (Alm, 2006; Ryan & Deci, 2002), supporting learners' basic needs of competence, autonomy and relatedness. The ability to resort to MTTs for learning activities (reading, writing, speaking and listening) was hypothesized to provide confidence, which, with developing machine translation literacy, would support a feeling of competence in learners. The learning environment was designed to be autonomy-supportive, as learners were able to engage with learning materials (text, audio, video) of their choice, made linguistically accessible through MTTs. Learners were asked to share their learning activities with each other to foster a feeling of togetherness.

Data collection and analysis

The learner data (blogs, videos, and written reports) were collected, transcribed (videos) and translated, and then collated on Excel for the preliminary analysis. The data were sorted thematically according to skills and affordance actualization. For the purpose of this report, only the data on L2 reading were used to create a five-step Affordance-Actualization model, providing insights into the process of individual and goal-directed affordance creation for MTT-based reading.

Analysis and Discussion

Table 1 shows the analysis of affordances for machine translation supported L2 reading. The first column lists the features of a machine translation tool that can be used to translate L2 text. The list is not exhaustive, only including the features identified by the participants. They used the Chrome extension of Google Translate, which translates entire webpages, and also glosses the text. By clicking on words, a pop-up menu appears with the written translation and a sound file of the word. The glosses appear on both the original and the translated page. Both Google Translate and DeepL were used as dictionaries on the browser or the app. Finally, the camera on the phone was listed as a feature to take photos of texts, which were then translated by the app. The second column contains the characteristics of the actors, that is, students using machine translation for reading. The list describes their abilities to operate the technical features from column 1. The elements in both lists are needed to *give rise to an affordance*, represented in the third column. Here we find examples of action. Prior to the intervention, participants predominantly used the dictionary function to translate words,

and the camera for live translations of longer texts or to translate posters, as illustrated in these two quotations:

- Last year I was reading a German novel, and I used the camera function to help me. For example, I read it in German first and then held my phone over a page so I could read it in English. After reading it in English, I read it again in German.
- When we were in Germany for the exchange, we both saw some posters. We could use the camera function on the poster to see what it was about.

The fourth columns list the actions taken after participants reflected on their learning goals and on ways to achieve them.

- I translate the Flutter articles into English so I can get an overview of what they're about.
- First, I read the website in German. Then I use Google Translate to read it in English. Finally, I read it again in German.
- The ability to easily translate back and forth means that I can read particularly difficult sentences in English, but still read most of the article in German.
- I write the words I don't know in Google Translate and then also in a Quizlet. This helps me a lot because I see these unknown words twice in German and English, then again when I continue reading the article, so I feel like I actually understood it.

These goals are individual to each learner, fulfilling a concrete purpose. Not all were anticipated as educational goals (column five) but supported the overarching aim of developing machine translation literacy for L2 reading.

Table 1. *Analysis of affordances for machine translation supported L2 reading*

Elements giving rise to an affordance:		3. Example immediate concrete outcome from data	4. Goal directed actions needed to actualize an affordance	5. Applicable goals and organizational context
1. Features of Machine Translation Tool	2. Characteristics of actors			
Affordance 1 Using machine translation for L2 reading			Actualization	
Webpage translation	- know how to install extension, - activate translation		- read in English to get an overview, then read in German - read first in German, then in English to fill the gaps - read in German, difficult passages in English	Goals: - MT literacy for L2 reading - enabling meaningful engagement with L2 texts - supporting vocabulary development
Glosses	- know how to activate glosses - use sound for pronunciation		- look up a few words - listening and reading for <u>vocabulary learning</u>	
Dictionary	- know how to enter words by typing, copying, speaking	- looking up words	- look up and save words (GT, Quizlet)	
Camera	- know how to use camera feature with MT app	- reading posters - reading novel with camera	- not useful for reading as texts are online	

The model clearly shows a shift in MT practices for L2 reading. Prior to the reflective activity, MT was used primarily as a dictionary. In addition, the camera feature was used to translate text. This feature was not perceived as useful in the academic context. Dictionary use, however, was extended to use the feature to save words (creation of phrasebooks) and export the spreadsheet generated by Google Translate into Quizlet for vocabulary revision. Further, the webpage translation and glossing feature (Chrome extension), which had not been used by any learner previously, was used extensively, providing individual learners with support at their level. While some used the translated page to get an overview of the article before they read the original German in detail, others flicked back and forth between versions, or only used the glosses to fill the gaps. The individual approaches show the action potential of the features, which turned into different affordances for each learner. Overall, however, they all contributed to higher engagement with the L2 texts, which would have been too difficult to read for most without the support of the online translators.

This short analysis demonstrates individual pathways to machine translation literacy, which have informed the overarching goal of supporting the development of MT literacy for L2 reading. The news articles became accessible and ensured meaningful engagement with the text. In relation to the SDT framework, the reading activity supported learners with a sense of autonomy, as they were able to choose and understand an article of their personal interest. The online translator further fostered a feeling of competence, as learners felt supported in the task of choosing and reading the text. Finally, the readings were discussed amongst students, giving the reading a social purpose and bringing them closer as a group, thus supporting a sense of togetherness.

Conclusion

This short extract of the preliminary analysis of affordance actualization in MT-based L2 reading has provided some insights into the benefits of MT use in language learning. Students felt supported in the task and, more fundamentally, in their basic human needs of autonomy, competence, and relatedness. The analysis has shown that language learners have a basic understanding of how machine translation can be used for language learning. By aligning MT use to specific learning goals (e.g. ability to read more in the L2), they are encouraged to look for features to support their goal. Extending Bowker's definition of Machine Translation Literacy, it seems appropriate to include the need for technical awareness of MT features which present differently in different MTs on the browser and on the app, and a sense of curiosity to make them work for their needs. Individual learners have actualized different affordances, providing a pool of best practice examples for machine translation literacy for L2 reading. Being an iterative process, the educational goals will evolve with the developing needs of learning and the technical developments of MTs. The larger study addresses affordance actualization for writing, listening, speaking and vocabulary development. It is anticipated that the analysis will reveal the interconnections between different affordances, which also support the interconnected nature of the individual tasks in the language learning process.

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