

# Use of AI-powered technologies in upper secondary language learning

Current tendencies and future perspectives

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# Abstract

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For many years, language technologies based on artificial intelligence (AI) have been influencing foreign language teaching. This is only expected to increase with the introduction of tools like ChatGPT. Until now, particularly machine translation (MT) has challenged Danish upper secondary language teachers, and the reaction has typically been to prohibit MT and thus not integrate it into teaching. However, this can be problematic if students use MT anyway, e.g. because it can result in inappropriate use of the technology. Likewise, today, we often come across machine translations and other AI-based texts online. This article presents the results of a survey conducted in language subjects of upper secondary students' use of and attitudes towards MT. The study shows a widespread use of MT, e.g. for homework and hand-in assignments. Against this background, and based on digital literacy theory, perspectives in incorporating AI-powered language technologies into foreign language teaching are discussed.

Sprogteknologier, der er baseret på kunstig intelligens (AI), har påvirket fremmedsprogundervisningen i mange år, og dette forventes kun at tiltage med introduktionen af værktøjer som ChatGPT. Hidtil har særligt maskinoversættelse udfordret fremmedsproglærere på danske ungdomsuddannelser, og reaktionen har oftest været at forbyde brugen og dermed ikke integrere teknologien i undervisningen. Det kan imidlertid være problematisk, hvis eleverne alligevel bruger maskinoversættelse, da det bl.a. kan resultere i, at de bruger teknologien på uhensigtsmæssige måder. Ligeledes sker det ofte i dag, at vi støder på maskinoversættelser og andre AI-baserede tekster på internettet. I denne artikel præsenteres en undersøgelse af gymnasieelevers brug af og holdninger til maskinoversættelse. Den indsamlede empiri er baseret på spørgeskemaundersøgelser i sprogfag på HHX og HTX. Undersøgelsen viser en udbredt brug af maskinoversættelse, bl.a. ifm. lektier og afleveringsopgaver. På denne baggrund og med udgangspunkt i teori om digital literacy diskuteres potentielle perspektiver i at inddrage AI-støttede sprogteknologier i fremmedsprogundervisningen.

# Use of AI-powered technologies in upper secondary language learning

## Current tendencies and future perspectives

### Introduction

For several years, we have discussed the need to build competencies that can prepare us for the 21st century (Griffin & Care, 2014; González-Pérez & Ramírez-Montoya, 2022). The digitization of society is often referred to as the third industrial revolution and marks the transition to the 21st century, however, Schwab (2017) has suggested a fourth industrial revolution which deals with automation, artificial intelligence (AI) and the use of robots. While this revolution has slowly evolved over the past years, with e.g. the development surrounding autonomous vehicles, people seem to have only recently realized the extent to which these technologies have entered, and will increasingly enter, our work and civic life. This is particularly apparent with the current discussion of generative AI technologies such as ChatGPT (OpenAI, 2023a). With such developments we believe it is necessary to shift focus from discussing the more loosely defined competencies for the future to discussing the more specific competencies necessary to deal with the present solutions. Not least within education, a discussion of how we can start to develop these competencies is imperative.

AI-powered technologies have been changing the conditions for foreign language teaching and learning for several years (Lee, 2023). The most prominent example is machine translation (MT) which is the automatic translation of text, i.e. translation without human intervention. Since 2016, MT systems have primarily been based on AI in the form of large language models drawing on neural networks, and there is broad agreement that AI has caused a major leap forward in MT quality. Billions of words are translated by Google Translate every single day, and a multitude of other free online MT services are avai-

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lable. Thus, MT can be described as software that is everywhere or, in other words, as “everyware” (Cronin, 2010). MT is an example of the type of methods within Natural Language Generation (NLG) which are referred to as text-to-text generation (Gatt & Krahmer, 2018). ChatGPT is another example of text-to-text generation which covers “applications that take existing texts as their input, and automatically produce a new, coherent text as output” (Gatt & Krahmer, 2018, p. 65). Input texts might be brief prompts (e.g. “write a text about X”) or texts that need to be processed in their entirety, for instance machine-translated, summarized or paraphrased.

Three recent reviews have examined research investigating the use of MT in foreign language learning (FLL) (Lee, 2023; Jolley & Maimone, 2022; Klimova et al., 2023). All three reviews conclude that MT has a positive impact on FLL. For instance, Klimova et al. found that MT is an efficient tool for developing both productive and receptive language skills and concluded that MT tools are “beneficial for FLL, the only question being the level of this beneficial impact” (Klimova et al., 2023, p. 677). However, the reviews also make it clear that teachers are still sceptical about using MT in their teaching, for instance because of limited trust in MT quality and in the effectiveness of using MT in FLL as well as a view of MT use as academic dishonesty or cheating. This often leads teachers to prohibit students from using MT and to teachers rarely addressing MT tools in their teaching in a constructive way. This picture is also clear in a Danish context, where a recent study of upper secondary language teachers’ integration of digital technologies has shown that MT is only used to a limited extent (Caviglia et al., 2021). Specifically, Caviglia et al. found that only 7% of language teachers use MT in their teaching, 5% indicate that they are considering using MT, and 29% advise students against using it. 59% of teachers simply state that they do not use MT. The very limited integration of MT in upper secondary language teaching might also, at least partly, be a consequence of MT tools being prohibited at exams (Børne- og Undervisningsministeriet, 2023).

If upper secondary students are using MT tools although their teachers do not integrate it into their teaching and maybe even in spite of having been advised against it, it can be problematic. For instance, it can have negative implications for the student-teacher relationship, and students might be using MT tools in non-optimal and inappropriate ways which might hinder learning. Therefore, several scholars have argued that students should be trained in how MT works (e.g., O’Neill, 2019; Vold, 2018) equipping them with so-called *machine translation literacy* (Bowker, 2021a).

Surprisingly, we know very little about students’ use of MT. In a university context, Dorst et al. (2022) have found that almost all Hu-

manities students are very or extremely familiar with Google Translate, and that almost 70% use Google Translate regularly. However, to our knowledge, no studies have investigated the use of MT by upper secondary students. Hence, in this paper, we first present a survey of how upper secondary students use MT tools. This, among other things, shows a widespread use of MT tools. Against this backdrop, the purpose of the paper is to discuss current tendencies and future perspectives of using AI-powered language technologies in foreign language teaching.

In the next section, we present background literature on MT including different approaches and ways in which MT can be used. We then continue the background section with selected literature on AI and digital literacy. The background section is followed by a methods section where we describe how we conducted the survey. We then present the results and finally discuss the use of AI-powered technologies and the development of the necessary literacy in foreign language teaching.

## Machine translation

MT is “a sub-field of computational linguistics (CL) or natural language processing (NLP) that investigates the use of software to translate text or speech from one natural language to another” (Liu & Zhang, 2015, p. 105). Within the field of NLP, it is, as mentioned above, an example of text-to-text generation within NLG. Around 2016, previous predominant approaches to MT, i.e. rule-based MT and statistical MT, were gradually replaced by so-called neural MT (NMT) drawing on AI. NMT has made it possible to train software to translate words and set of words in the context in which they are embedded instead of translating isolated words and recombining these in the target language (Pym, 2019), leading to increased output quality.

Apart from so-called “pull” situations where a user seeks out a machine-translated version of a source text him-/herself, e.g. through a free online MT service such as Google Translate, MT is also provided in many “push” situations where a translation is pushed to the user without him/her having actively requested one. This goes for e.g. automatic translations of user-generated content on social media such as Facebook and Instagram and on platforms such as Tripadvisor and Airbnb. This means that e.g. students may have a high consumption

of machine-translated texts although they are not actively using MT tools.

Within human evaluation of MT quality, it is common to distinguish between the fluency and adequacy of machine-translated output, often a sentence (Koehn, 2010; O'Brien, 2017). Adequacy refers to “the meaning of the MT output in relation to the meaning of the source language segment” (O'Brien, 2017, p. 315), whereas fluency refers to the grammatical correctness of the MT output. With NMT, translations are often fluent, i.e. grammatically correct, which may lead a user to believe that they are also adequate renderings of the source text content. However, for example, parts of the source text content may have been left out, new content may have been added, and words may have been mistranslated (Klimova et al., 2023), leading to an inadequate rendering of the source text content. This has caused scholars to refer to NMT as deceptively fluent (cf. e.g. Martindale and Carpuat, 2018). Other common problematic issues with machine-translated output include bias, formality levels, incoherence, and terminological inconsistency (Klimova et al., 2023).

If MT is used just to get the gist of the source text content, there is no need to make changes to the machine-translated text. It is simply used in its *raw* form (Way, 2013). This is typically the case with the use of MT for the translation of user-generated content. However, if MT is being used as a step in producing a text ready for publication, the MT output usually needs to be checked, and errors need to be corrected. This is an activity usually referred to as post-editing (O'Brien, 2022). Here, scholars typically distinguish between light and full post-editing. In light post-editing, focus is on ensuring that the translation is “an understandable reflection of the source-text content, but ignoring stylistic niceties” (Way, 2013, p. 4), whereas full post-editing involves producing a text “that is not only understandable, but also presented in a stylistically appropriate way” (Way, 2013, p. 4). This distinction is not unproblematic, but very common in the literature, and we will not delve further into the discussion here. Post-editing is a very common activity carried out by professional translators, and several studies on the integration of MT in FLL have focused on developing students' post-editing skills.

## Digital literacies and learning

To be part of the 21st century civic life, it is important that students acquire the necessary skills to become knowledge creators rather than just passive consumers of information (Gretter and Yadav, 2016). This includes skills within creativity and critical analysis that help prepare students to both create and critically analyze digital materials. According to Gretter and Yadav (2016), a combination of computational thinking and media and information literacy (Grizzle et al., 2014) can help students achieve digital creativity and critical awareness in a globalized and hyper-connected world.

Media and information literacy (Wilson et al., 2013) is a term coined by UNESCO. Here, the need to build critical analytical skills with media and information consumers is emphasized. This has the purpose of empowering consumers and strengthening their critical sense and communication skills. This includes, among other things, knowledge of how to access and evaluate information, and understand how it can be used in an ethical manner, as well as being able to understand the media's role in our daily lives. Furthermore, it is important to be able to understand computer technologies and how the Internet influences the spread of information in a globalized and connected world (Grizzle et al., 2014). One of the widespread computer technologies that affect the information on the Internet today is MT where users often meet content that has been automatically translated ("push" situations) or use MT themselves ("pull" situations).

The actual use of online MT tools is very simple – it only requires writing or pasting a text into the source text window, choosing the languages involved and hitting the "translate" button. However, using such tools in an informed and critical way is less simple. Therefore, students in general (Bowker, 2021a) and language learners (Carré et al., 2022) should acquire literacy related to MT, not least because research has shown that students who are trained in how MT works perform significantly better when using MT for writing tasks (O'Neill, 2019). The fact that training matters is also emphasized by Vold who concludes that "training, scaffolding techniques and guidance from the teacher are of paramount importance" (Vold, 2018, p. 89) when integrating MT into foreign language teaching.

MT literacy is defined by O'Brien and Ehrensberger-Dow as "knowing how MT works, how it can be useful in a particular context, and what the implications are of using MT for specific communicative needs" (2020, p. 146). However, to our knowledge, no studies have developed didactic frameworks for the introduction of MT literacy in upper secondary education. In fact, studies conducted on the effectiveness of MT in language teaching and learning have predominantly focused on

university students (see e.g. Lee, 2023; Klimova et al., 2023), and these studies have typically not included teacher interventions or student trainings for using MT but have rather used MT as an instrument.

In a university context, Bowker (2021b) has tested five different formats for MT literacy instruction to undergraduate students who are not studying to become language professionals. She suggests the following key elements of MT literacy instruction: (1) Understanding data-driven approaches to MT, (2) Transparency and MT use, (3) Risk assessment and MT, and (4) Interacting with MT. *Understanding data-driven approaches to MT* includes giving students a basic knowledge of how e.g. NMT works. This will make students understand why different MT tools may be more or less useful for different language pairs and text types, why different MT tools are likely to produce different results for the same source text, and why results might change from one translation of a source text to the next. Also, this element should make students aware of potential bias in MT output. The element *transparency and MT use* encourages students to be transparent about their use of MT, e.g. when citing material that has been translated. Also, students should be made aware that the use of MT “may be more or less appropriate depending on the learning objectives of the course” (Bowker, 2021b, p. 27) and on teacher preferences. Bowker also stresses that being transparent about the use of MT is important because it enables the readers of a machine-translated text to make a qualified decision as to how much to trust the content. The element *risk assessment and MT* has two overall dimensions: firstly, students should understand that the use of MT may carry a lower or higher risk depending on the use case. For instance, using MT to understand a friend’s post on social media carries another risk than using MT to translate documents within legal or health care settings such as contracts or patient information leaflets. Secondly, students should learn that they should not enter sensitive information into a free online MT tool because data is kept and reused. Finally, *interacting with MT* includes facilitating that students get hands-on experience with improving MT quality, either by correcting the output (post-editing) or improving the source text (pre-editing).

The skills and competencies defined in relation to the development of media and information literacy and MT literacy are also important when evaluating text produced by generative AI tools such as ChatGPT. When working with this type of technology, a basic understanding of AI or so-called AI literacy is also required. Possessing AI literacy means to have the essential abilities that people need to live, learn, and work in our digital world with AI technologies (Ng et al., 2021).

Long and Magerko (2020) describe AI literacy in terms of 16 com-



petencies needed to interact with and evaluate AI. These competencies include being able to recognize an AI as well as understanding how an AI works and what the strengths and weaknesses of an AI are. This includes competencies to identify different ethical issues such as privacy, transparency, diversity, bias, and accountability. Similarly, Ng and colleagues (2021) identify four aspects of AI literacy: know and understand, use and apply, evaluate and create, and ethical issues.

It can be difficult for people to spot AI technology when it is integrated into various applications. As an example, it is not always clear when something is written by an AI. This can lead to misunderstandings and make it more difficult to critically evaluate e.g. online content. It can also make interaction and collaboration more difficult if you are not aware that you are in fact interacting with an AI and not a living person (Long & Magerko 2020). Similarly, a lack of understanding of what AI is and how it works can lead to bad or incorrect use of the technology.

Research on how to teach and learn AI literacy is very sparse. A recent literature review on the topic (Ng et al., 2021) found 30 relevant papers. However, of these, many were preliminary results, and only eight were published in scientific journals. Among other things, Ng and colleagues (2021) pointed to a lack of research into how to use learning artefacts and integrate AI literacy effectively into K-12 classrooms to motivate students to learn about AI. It is also pointed out that teachers should update their AI knowledge to be able to offer better and more personalized learning to students.

Based on the above, it is clear that literature on MT literacy, media and information literacy, and AI literacy share many similar elements. However, specifically in relation to AI-powered language technologies in upper secondary language learning, our knowledge of necessary literacy elements is very limited. Therefore, in the discussion section, drawing on the insights from a survey of upper secondary students' use of MT and on this section on digital literacies, we will discuss the development of the necessary literacy in language teaching.

## **Methods**

The empirical data for this article were collected through a survey conducted in August/September 2021 at different Danish upper secondary education institutions and in different language subjects. At two institutions, students attending The Higher Technical Examination Programme (HTX) were invited to join the study, and at one other institution, students attending The Higher Commercial Examination Programme (HHX) were invited. In the survey the students were asked questions about their use of MT, how often they use it and for what purposes. The students were asked to provide their study year and

studied language. Other than that, no background information was requested.

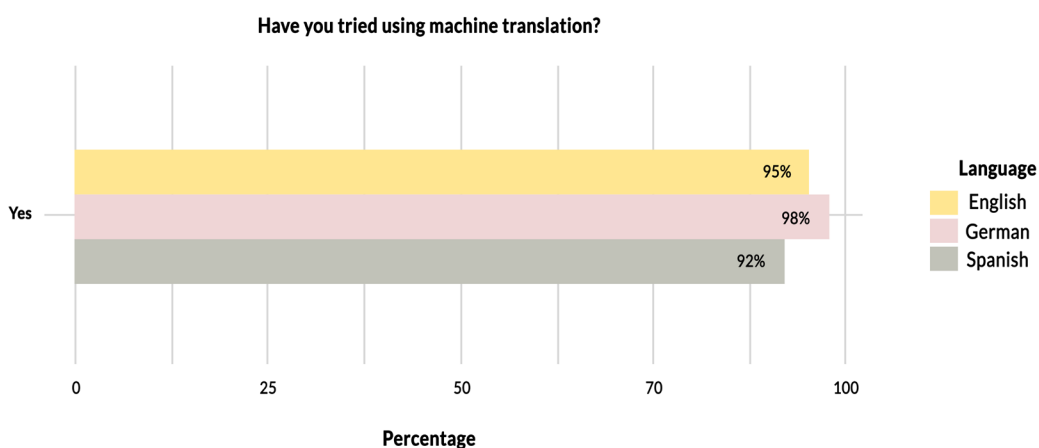
The survey was created in SurveyXact, a software used to create and distribute questionnaire-based surveys. A link to the survey was distributed to students through their teachers in the specific language subjects. The fact that the survey was distributed to students through their teachers has some potential drawbacks. For instance, the teachers might not have given similar instructions, and the fact alone that teachers distributed the survey might have introduced a bias due to the attitudes of the teachers towards MT as perceived by the students. However, we attempted to address this by stressing in the introductory survey text that the data would be treated anonymously, and that it was important to provide honest answers even if the student had the perception that his/her teacher did not like MT. As a supplement to the introductory text, teachers were also provided with instructions which were used to orally prepare the students before filling out the survey. The collected data include responses from 55 second year HTX students in the subject English, 56 second year HHX students in the subject German and 36 HHX students (20 second year and 16 third year students) in the subject Spanish.

The 55 responses from English students represent three classes taught by two different teachers. The 56 German students represent two classes taught by the same teacher, and the 36 Spanish students represent two classes taught by two different teachers. Since we do not know the complete number of students in each class, unfortunately, we are not able to provide an exact response rate, however, we do know that classes are not allowed to surpass a class size ratio of 28 students. Thus, we can conclude that the response rate is relatively high, especially for German students. With the given sample size, an experimental error of a certain size is to be expected, especially when comparing the different language classes. Since only three upper secondary institutions and a limited number of classes and teachers were involved in the survey, the generalisability of the results is also limited. Further, since we did not include demographic background questions, we are not able to say anything about the differences between the use of MT by, for instance, different genders. However, the survey should be able to give us indications of the overall tendencies and attitudes towards MT.

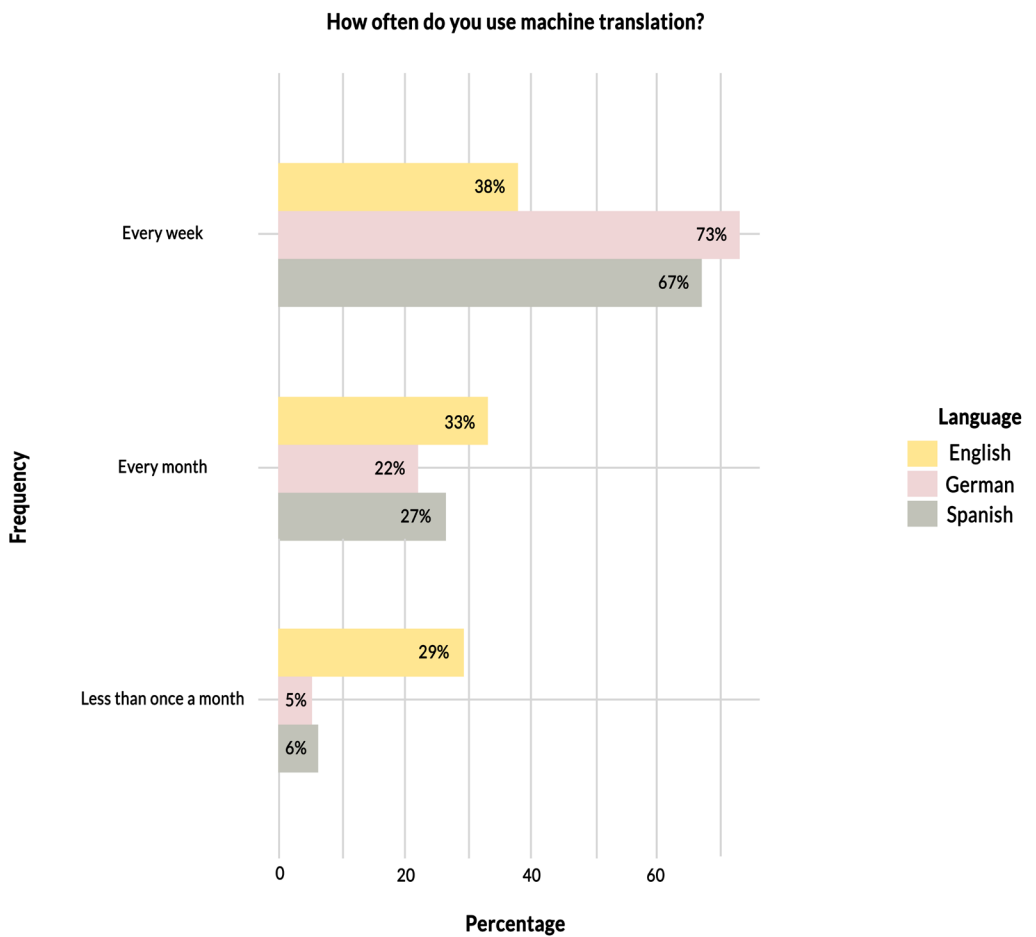
## Upper secondary students' use of machine translation

As is evident from Figure 1, 95% of English students (n=55) indicated that they had tried using MT. This number was 98% for German students (n=56) and 92% for Spanish students (n=36). In terms of frequency of use, as shown in Figure 2, 38% of English students answered that they use MT every week, 33% every month, and 29% answered less than once a month. For German students, this was 73%, 22% and 5%, and for Spanish students 67%, 27% and 6%, respectively. Thus, although almost all students have tried using MT, we see a more pronounced use of MT with German and Spanish students. Since in a Danish context, German and Spanish are typically the students' third languages (L3), a plausible explanation for this is a lower L3 proficiency compared to the L2 (typically English) and thus a greater need for assistance both during productive and receptive tasks.

**Figure 1.**  
*Percentage of students who have tried using machine translation.*



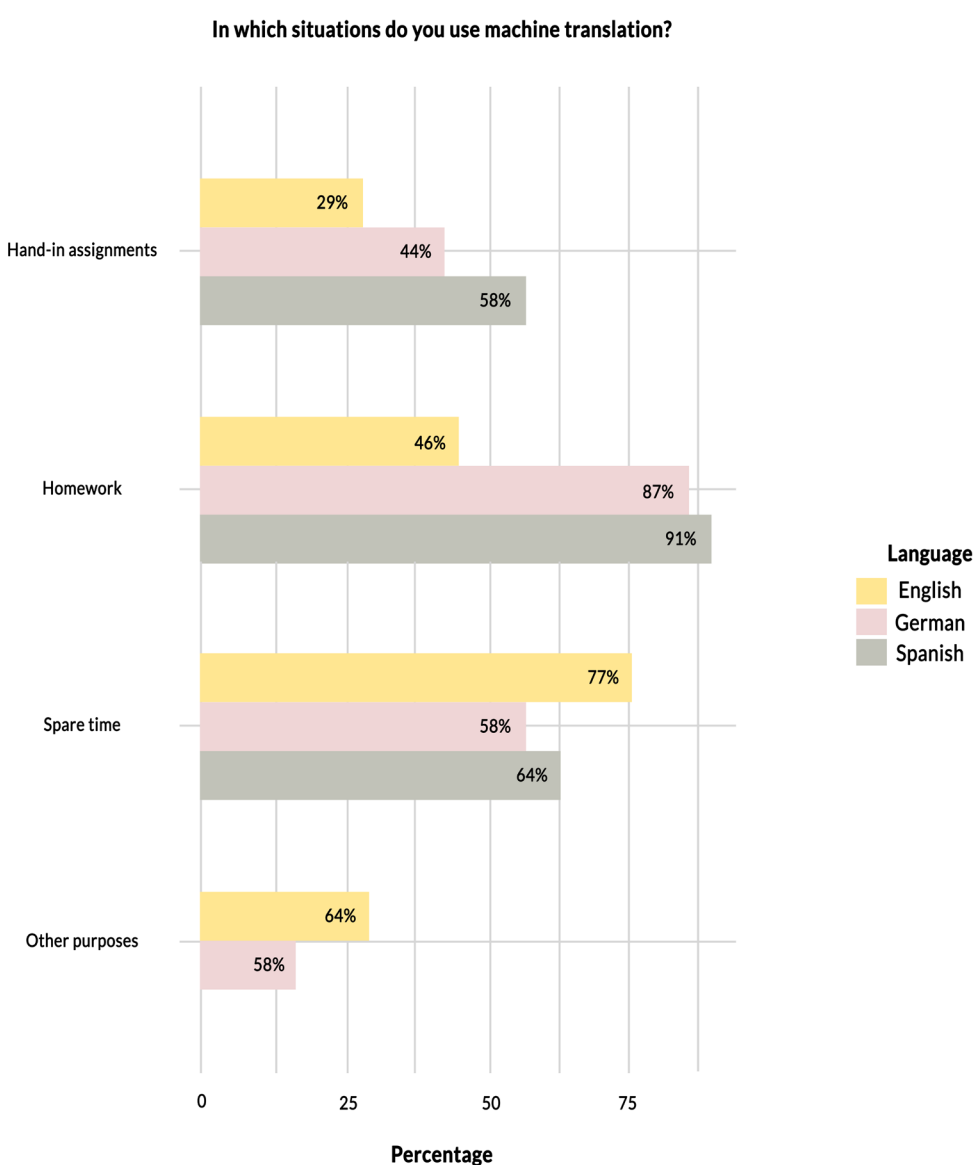
**Figure 2.**  
*Frequency of machine translation use.*



As shown by Figure 3, when asked about the situations in which the students use MT, 29% of English students, 44% of German students and 58% of Spanish students answered that they use MT when preparing hand-in assignments to be evaluated by the teacher. 46% of English students, 87% of German and 91% of Spanish students responded that they use MT when doing their homework. 77% of English, 58% of German and 64% of Spanish students indicated that they use MT in their spare time. Finally, 29% of English, 16% of German and 0% of Spanish students used MT for other purposes. It is interesting to note here that German and Spanish students use MT tools for hand-in

assignments and homework much more often than English students, whereas the use of MT in the spare time was more frequent for English students. Other purposes included the use of MT to check a sentence before saying something orally in class and to translate words from languages other than the ones the students were studying (such as Finnish or Romanian).

**Figure 3.**  
Situations in which machine translation is used.



The students were also asked whether they use MT to translate single words, single sentences and/or whole paragraphs/texts. Here, 85% of English, 65% of German and 79% of Spanish students answered single words. 50% of English students used MT for translating single sentences; this was the case for 82% of German and 76% of Spanish students. Finally, 8% of English, 40% of German and 36% of Spanish students used MT to translate paragraphs/texts. These results show us that students from all language subjects most commonly use MT for the translation of single words or single sentences. The widespread use for single words might indicate that students use MT as an alternative to a bilingual dictionary; something that was also observed by e.g. Dorst et al. (2022). However, since NMT draws on context, this is not a recommended way of using MT (e.g. Ducar & Schocket 2018). Interestingly, the rather large number of German and Spanish students using MT to translate whole paragraphs or texts might indicate that students in L3 subjects use MT more frequently to assist with receptive tasks than students in L2 subjects.

Next, the students were to answer a question about how high or low they assessed the quality of MT output to be. Here, the answers were very similar. Between 44% and 48% of students neither assessed quality to be high or low, around 20% either found the quality high or low, and 0-5% found the quality very high or very low. Also, between 5% and 8% stated that it was difficult for them to assess. A possible explanation for the high number of students who either could not assess MT quality or judged it to be neither high nor low might be that it is difficult for upper secondary students to evaluate MT quality due to their language proficiency level. This would be in line with Chung's study (2020) of university students which found that more advanced students are more critical of MT quality than students with lower language proficiency. Another potential explanation is that the students have not received any instructions as to how to evaluate MT output, e.g. an introduction to the concepts of fluency and adequacy.

When asked whether they know their teacher's attitude towards MT, 60% of English, 95% of German and 73% of Spanish students answered "yes". Hence, most students believe to know the teacher's attitude. Again, this is more pronounced in L3 subjects. When they were asked to describe the attitude, there were different types of answers. A lot of students simply stated that the teacher did not like it (e.g. "She hates it" or "She is not a fan") or that MT should not be used (e.g. "She does not want us to use it" or "It is stupid to use it"). Other students specifically mentioned that their teacher did not want them to use MT tools such as Google Translate, but instead told them to use a dictionary (e.g. "She does not like Google Translate, but the dictionary is okay"). Some students also mentioned that the teacher thinks they are

cheating themselves when they are using MT (e.g. “You are cheating yourself”). A low number of answers indicated that the teacher allowed the use of MT for small linguistic units or for certain tasks (e.g. “For single words it is fine – otherwise it is a ‘no thank you’” or “We can use it to understand things, but she doesn’t want us to use it for hand-in assignments since that would be a waste of our and her time”). Interestingly, one student pointed out that the teacher did not want the students to use MT and thinks she is catching them in using it even when they are not. This is an indication that prohibiting MT might lead to an atmosphere of suspicion in the FLL classroom. The general perception of students that the teachers do not like MT seems to correspond to the results by Caviglia et al. (2021) showing a very limited integration of MT in Danish upper secondary language learning.

## Discussion

95% of all students in our survey indicated that they have tried using MT, and 57% use MT every week. These results point towards a regular use of MT tools among the students from all language subjects. The results also indicate that MT is primarily used for the translation of single words and sentences, and that it is used for a range of tasks, i.e. both for preparing hand-in assignments, homework and during the students’ spare time. Further, the findings showed that German and Spanish students use MT for school-related purposes more often than English students, and that English students are more inclined to use it in their spare time. Nonetheless, the widespread use of MT by students for educational purposes stands in sharp contrast to the teachers’ general reluctance and limited integration of MT as shown in the students’ statements in our survey and in (Caviglia et al., 2021; Lee, 2023; Jolley & Maimone, 2022; Klimova et al., 2023).

The widespread use of MT particularly by German and Spanish students might pose an issue since we anticipate that students in L3 subjects may find it more difficult to evaluate and identify errors in MT output, as they typically have fewer years of language learning compared to English students. This may especially be true for aspects such as fluency and adequacy, which require a nuanced understanding of the target language. However, our data do not deliver insights into whether L3 students used MT in a less critical way than L2 students, and we have not encountered any other studies comparing the use of MT in L2 and L3 subjects. Also, previous studies have shown in-

consistent findings in terms of the influence of L2 proficiency on MT use (Lee, 2023). The quite widespread use of MT for preparing hand-in assignments is also noteworthy. When MT is prohibited by teachers, this is done secretly, and thus, it is difficult, if not impossible, for the teachers to know what the students have done themselves and what has been machine-translated. In this context, it is also interesting that with increasing MT quality, it is more often signs of untypically good text production that signal MT use rather than weaknesses in students' assignments (Jolley & Maimone, 2022; Ducar & Schocket, 2018). For example, the signs could be linguistic forms that students have not yet been introduced to. In other words, nowadays, teachers may detect MT use because of unusually high rather than because of low quality. Of course, from a teacher's point of view, it seems fruitless and maybe even frustrating to be evaluating an assignment produced entirely by MT, and an excessive and uncritical use of MT might lead to students not learning much. In such situations, MT can become a shortcut in the sense that the student simply "outsources" work (Dalsgaard et al., 2022) to the technology to avoid doing the work him- or herself. These are some of the understandable reasons for teachers' opposition to MT and their reaction of trying to prohibit MT use in language learning.

However, the lack of integration of omnipresent technologies such as MT as well as prohibiting students from using MT may not only create an atmosphere of suspicion in the language classroom, but also create a situation where students use the technology without any didactic introduction. They are thus left to themselves in terms of developing appropriate strategies when using MT. This could lead to students using MT in non-optimal ways such as using MT to translate single words which was frequent in our survey. In order to enable students to use MT tools as a "cognitive partner" where the technology is used productively and supports learning (Dalsgaard et al., 2022), they need to gain the necessary literacy. Along the same lines, Vold (2018) for instance emphasises the importance of teacher's guidance when learning to use MT, and O'Neill (2019) points out that learners who are trained, even briefly, in how MT works, write better compositions than those with no training.

Thus, teaching basic instructions on how to use MT tools seems to improve the students' use of MT, but it remains uncertain whether such instructions are sufficient considering the widespread use of MT in today's context. With new tools and technologies such as ChatGPT, which can also be used for MT, we expect the development to continue in the direction of more AI-generated text and not less. Thus, we will gradually come across more and more content that is generated or translated by a machine. For example, this may happen when we



browse content on social media and when we read articles posted online. While it is often declared if a text is generated or translated by a machine, this is not always the case. Furthermore, given the speed at which we typically consume online content, we may not recognize machine-generated text as such. Also, AI-powered language tools are increasingly being integrated into various applications such as the Microsoft 365 suite (Microsoft, 2023) where we can use them to assist our own text production. The need to learn more about AI-generated content must therefore be seen both from a content consumer and a content creator perspective. Hence, we argue for a need to teach students competencies that can guide them with good practices and ethical considerations when they actively use MT and text generation technologies (i.e. in “pull” situations”) as well as enable them to critically evaluate translated or generated content (in both “pull” and “push” situations). Since we see a fusion of various technologies in today’s applications, we will draw on literature within the fields of both MT literacy, AI literacy, and media and information literacy to identify or fuse relevant competencies and practices that need to be taught to meet the beforementioned dualistic requirements for AI-powered language technologies.

According to UNESCO’s report (Grizzle et al., 2014), critical analytical and critical awareness skills are important parts of developing media and information literacy. Akin to the importance of being able to critically analyze information shared on the Internet, it will, in the immediate future, also be important to be able to critically assess if the author is a human or a machine and furthermore be able to assess the authenticity of generated content. The ability to recognize that you are interacting with an AI is a competency described within AI literacy (Ng et al., 2021; Long and Magerko, 2020). In general, we expect to be seeing a future where work tasks and cognition are distributed between people and AI-based technologies to a high degree which requires people to be able to understand, assess, collaborate, and interact with these technologies.

Many of the aspects or competencies of AI literacy (Ng et al., 2021; Long and Magerko, 2020) overlap with the competencies described in MT literacy (Bowker, 2021b). The recurring themes seem to be the significance of possessing a fundamental understanding of the workings, strengths and weaknesses of the technology, competencies for proper usage and evaluation of AI-generated text, and knowledge of the precautions to take when the technologies are being utilized. Also, different aspects of ethical use of AI are underlined, including transparency of use and privacy issues. Within the context of upper secondary education, together with the ability to recognize AI-gene-

rated text, these elements seem to be indispensable, both in terms of language learning, but also in relation to the students' general digital literacy. This should, for example, equip students with an understanding of AI-powered technologies enabling them to critically analyze text content produced by these and to use the technologies to create content themselves, e.g. drawing on post-editing. This includes knowing how and when to use them, being able to determine the risk of using them for a given task and evaluate the content from e.g. linguistic, pragmatic and cultural perspectives.

Apart from what the literature has pointed out, there are some aspects that seem particularly relevant to MT, on the one hand, where the goal is to reproduce the entire content of a source text in another language and, on the other hand, tools such as ChatGPT that can produce new text based on brief prompts. In relation to the former, while the concepts of adequacy and fluency are important, and students should know that machine-translated text may be deceptively fluent, it is also important that students understand that a good translation is not necessarily just an adequate and fluent rendering of the source text content. Rather, due to culture-specific differences, translations should often be adapted to conform to the norms and conventions of the target culture, "taking into account what target-culture members can be expected to know or feel about the subject in question" (Nord, 1997, p. 46). Thus, a 1:1 fluent machine translation is not necessarily a good translation. In relation to the latter, it seems important that students learn to evaluate the authenticity of the generated text. Scholars (e.g. Dale, 2021) and tool developers themselves have emphasized that language models might generate output that is plausible-sounding, but not consonant with the truth, a phenomenon often referred to as "hallucination" (OpenAI, 2023b). Therefore, users must consider whether they can reasonably assume that generated text is correct and must develop skills in terms of verifying or disproving generated content. Also, such tools are sensitive to the phrasing of the prompts and may, based on one phrasing, claim to not know the answer to a question, but then answer correctly after a slight rephrase. This has given rise to a relatively new phenomenon referred to as "prompt engineering" which involves developing and optimizing prompts in order to use AI models efficiently. In our view, in upper secondary education, students should gain at least a basic awareness of the sensitivity of AI tools to prompt phrasings.

If students are to acquire competencies related to AI-powered language technologies, it is a prerequisite that the teachers' literacy is also developed. In order for them to integrate AI-powered language technologies in FLL, they need not only to gain the same competencies as the students; they also need knowledge on how AI can enhance FLL.

In line with this, the European Commission's (2023) European Digital Education Hub argues that knowledge of how to engage confidently, critically and safely with AI systems and knowledge of technical AI basics are pre-requisites for teaching with AI, i.e. for the application of AI in learning contexts. We argue that teaching with AI in FLL requires didactic knowledge of how AI can support students' use of the technologies as "cognitive partners" in FLL. In this context, Dalsgaard et al. (2023) mention MT systems and AI chatbots as useful tools to explore the foreign language, i.e. to find ways to express oneself in the foreign language, to find solutions to linguistic problems and to produce text. While language teachers' level of literacy as to AI-powered language technologies has not been explored, teachers' general lack of digital competencies such as computational thinking is well documented, and we assume this is also the case for AI literacy in FLL. Initiatives to support teachers in building this literacy would be welcome.

With the current rapid development in AI-powered language technologies and the increasing integration of these technologies into various platforms, it is imperative that research is conducted on students' use of and attitudes towards the tools. Also, we need research exploring different approaches for teaching and learning about the technologies and building the necessary literacies.

With the widespread use of MT by students shown by this study, it seems plausible that students will also, at least gradually, adopt tools such as ChatGPT into their set of digital resources. Thus, although MT tools have already been changing the conditions for upper secondary language teaching and learning for many years, the impact of AI-powered language technologies will probably only increase from here on. In our view, it is of vital importance that we aim to narrow the gap between students' and teachers' practices that has characterized FLL for several years, namely a situation where, roughly speaking, all students are using the tools, and teachers are reacting by prohibiting them. This requires integration of language technologies into FLL and with this integration a legitimisation of a practice that is already widespread. However, at the same time, we should avoid a situation where students simply outsource their work to technology. A possible solution might be to distinguish between "learning contexts" and "performance contexts" (Dalsgaard et al., 2022) to a greater degree. In learning contexts, students can get help and support by entering into a partnership with digital tools, and conversely, in performance contexts, they are expected to have the ability to independently express themselves in the foreign language. Dalsgaard et al. (2022) seem to equate performance contexts with exams where MT tools are currently prohibited, however, there seems to be a potential in also distinguishing between learning and performance contexts in

the daily teaching. For instance, Brunø (2023) and colleagues have experimented with letting the students' preparation time at home being a pure learning context without any following assessment by the teacher. During this preparation students have all digital resources at their disposal. This is then followed by tests in the classroom where the students complete assignments directly related to their preparations without having access to digital resources. The aim of Brunø (2023) and colleagues is to give the students the experience that the preparation work pays off in the performance context.

## Conclusion and future perspectives

Based on our study, we see a widespread use of AI-powered technologies by students in FLL. However, many educators are sceptical about using these technologies in language teaching and resort to prohibiting them. This is partly due to concerns about whether using the beforementioned technologies will hinder students' language learning and whether the technologies will be abused, e.g. for cheating. This is understandable, however, at the same time, it poses a problem as the students do not develop the necessary literacy and competencies required to use the technologies appropriately, leading to a potential misuse. Furthermore, the students are not prepared for encountering content created by AI-powered technologies which is proliferating with the increase in the use of AI-based solutions in society.

To keep up with the rapid development of new technologies, we recommend teaching students basic digital literacy and competencies to prepare them for AI-powered technologies, and in this paper, based on digital literacy theory, we have suggested elements that should be included. This is not only essential to enable students to use these technologies in effective and appropriate ways, but also to make them able to critically evaluate AI-generated content. Furthermore, given the limited research in this area, there is a need to explore the integration of these technologies into foreign language teaching in ways that scaffold the development of said competencies and that support students' language learning, i.e., in ways that are in line with theories on language acquisition.

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