Calafato *Asian. J. Second. Foreign. Lang. Educ.* (2023) 8:20
https://doi.org/10.1186/s40862-023-00194-5

Asian-Pacific Journal of Second and Foreign Language Education

RESEARCH Open Access

Charting the motivation, self-efficacy beliefs, language learning strategies, and achievement of multilingual university students learning Arabic as a foreign language

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Abstract

Research on the relationship between students' language learning motivation (LLM), language learning strategies (LLS), self-efficacy beliefs (SEB), and achievement in non-European languages has been both limited and overwhelmingly cross-sectional, often with little attention paid to their multilingualism. Combining complex dynamic systems and sociocultural perspectives, this article reports on a study that explored changes in the LLM, LLS, and SEB trajectories of two multilingual students taking Arabic at a university in Norway over two semesters, including how these trajectories, alongside their multilingual competence, related to their achievement in the course. Data were gathered through weekly semi-structured interviews and a rating scale-based log that the participants kept of their LLM and SEB, as well as their exam scores over two semesters. The results indicated that, although their LLS remained fairly consistent or grew more diversified, the participants were not completely successful in maintaining or boosting their LLM, SEB, or achievement. However, the use of more varied digital LLS appeared to prevent their LLM and SEB from further weakening. Moreover, participants' LLM and SEB trajectories were susceptible to changes based on different timescales in that mesogenetic events had a more pronounced effect on one participant while the other was more sensitive to microgenetic events. Finally, despite both participants being multilingual, they were unable to benefit from their multilingual competence past the first semester, indicating that not all manifestations of multilingual competence are useful over time, especially when such competence does not contain a multilingual morphosyntactic awareness component.

Keywords: Motivation, Self-efficacy beliefs, Language learning strategies, Multilingual competence, Arabic, Foreign languages

Introduction

Motivation plays a decisive role in how individuals organize their behaviour over time and can be predictive of the extent to which they achieve a satisfactory outcome in undertakings (Teng et al., 2021). It is also shown to be tightly connected with self-efficacy beliefs (SEB), that is, the extent to which individuals think they can realize

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outcomes through their behaviour (Piniel & Csizér, 2015). Drawing on self-determination theory, we can conceptualize motivation as comprising interlinked need states and the extent to which people consider satisfying these states to be desirable, valuable, or vital (Reeve & Lee, 2019). In the field of language education research, language learning motivation (LLM) studies are many, and several frameworks exist that purport to provide a basis for its investigation (e.g., the L2 Motivational Self System or L2MSS for short, Directed Motivational Currents, etc.; for an overview, see Mahmoodi and Yousefi (2022)). This is unsurprising as boosting and sustaining the motivation of students to learn languages is an important goal for teachers and educational institutions all over the world (and for the students themselves), especially given reports about falling interest in language education in some countries (e.g., the United States and Britain) and a general perception among students that learning languages is a difficult endeavour (Altschuler & Wippman, 2022; Roberts & Martin, 2022).

Here, it is important to point out that one's motivations do not consist of *static* need states; rather, they can evolve (Yashima & Arano, 2015). What motivates an individual to learn a language and achieve good results in it today may no longer hold tomorrow (i.e., they may adopt different goals). In terms of concepts and variables, LLM has been explored alongside affect (e.g., anxiety), self-regulation, and achievement (besides SEB), with the findings suggesting that these sometimes have a positive relationship (Csizér et al., 2021). At the same time, three things become apparent regarding LLM research. The first is that longitudinal studies that chart LLM among learners (e.g., Nitta, 2013; Yaghoubinejad et al., 2017), including in connection with SEB, achievement, or the other variables mentioned above, remain very limited when compared to cross-sectional research (for reviews of studies, see Boo et al. (2015), Lanvers (2017), Mahmoodi and Yousefi (2022)). Where longitudinal studies have been conducted, they consist of participants' recollections of past events (often from some time ago) instead of in-the-moment reports of LLM (e.g., Papi and Hiver (2020), Yashima and Arano (2015)). It is also worth mentioning that LLM studies, whether longitudinal or cross-sectional, have generally looked at variables in isolation, as pointed out by several researchers (e.g., Papi and Hiver (2020), Ushioda (2020)).

Second, and representing a much bigger (albeit gradually diminishing) gap, is the limited attention allocated to languages other than English in LLM research, especially non-European languages. Understandably, English receives the bulk of interest due to its status as *the* global lingua franca, but studies also clearly show a shift in student attitudes where they no longer see English as the *only* language worth learning, both for instrumental and intrinsic reasons (e.g., learning other languages is seen as beneficial in terms of employment *and* social identity) (Calafato & Tang, 2019; Wang & Liu, 2020). Among the non-European languages that have received the least attention is Arabic, despite its significant footprint in several countries globally, oftentimes due to (primarily) immigration from the Middle East. Studies on the learning of Arabic as a foreign language have been limited to the United States (Alkhateeb, 2014; Husseinali, 2006), the Gulf States (Calafato & Tang, 2019; Calafato, 2022; Eltahir et al., 2021; Tang & Calafato, 2021), and Malaysia (Yusri et al., 2013), with few studies (e.g., Calafato, 2020) exploring motivation

for Arabic learning in other regions where Arabic as a foreign language programs are offered in primary, secondary, or tertiary education.

Because motivation can be object-bound (e.g., students' motivation for learning Arabic can differ from that of other languages such as English or Spanish; see Calafato and Tang (2019); Calafato (2021a), Dewaele and Proietti Ergün (2020), Zheng et al., (2019)) and influenced by context (e.g., students in some countries may be motivated to learn Arabic in a way that qualitatively differs from those residing in other countries), there is a need for studies on learning Arabic as a foreign language (but also other non-European languages) from contexts outside those mentioned above, for example, in Europe, which was the focus of this study. This would provide us not only with a more comprehensive understanding of LLM internationally (as this concerns diverse languages and not just English or other European languages) but also so that institutions have data specific to their context, which they can use to support their students' learning by adjusting their language programs and teaching approaches. And third, students' multilingual competence (Jessner, 2008), that is, their ability to draw on their entire linguistic repertoire and previous language learning experiences to support their interactions with the environment, and how this competence interacts with their LLM, language learning strategies (LLS), and SEB, have received very limited attention in LLM research (e.g., Li and Zheng (2021); some work has been done on learners' desire to *achieve* multilingual competence; see Henry and Thorsen (2018)).

Moreover, almost nothing exists with respect to multilingual competence and its effects on LLM, LLS, or SEB regarding the learning of Arabic as a foreign language. This is a significant research gap since most learners of Arabic already possess experience learning a language (or languages) and certain skills derived from this experience (Jessner, 2008), which should affect their Arabic-related LLM, LLS, and SEB. Furthermore, European countries have placed a growing emphasis on using multilingualism as a resource in education (Council of Europe, 2020), even if they have not explicitly addressed the motivational aspects of multilingual competence. The study covered in this article sought to contribute to LLM research by exploring the relationship over time between students' Arabic-related LLM, LLS, and SEB, as well as their multilingual competence and achievement in the language. A longitudinal case study design was used where data were gathered through weekly recorded semi-structured interviews with participants over two semesters and their end-of-semester exam scores. The study, which adopted an integrated dynamic systems and sociocultural approach (Yashima & Arano, 2015) as its primary framework, contributes to our understanding of the interactions between students' LLM, LLS, SEB, multilingual competence (i.e., their knowledge of multiple languages and associated experiences), and achievement as these concern the learning of Arabic as a foreign language in tertiary education in Europe.

A dynamic systems and sociocultural framework for LLM

The language learning process is complex, composed of a multitude of aspects, much like the complex nature of the individuals who engage in it. Recognition of this complexity can be referred to as the dynamic turn in language learning research, where each person is seen as having an "individual learning experience… a particular motivation and learning style", employing "certain learning strategies… in a specific

context", and striving to make sense of the totality of their experience "in their own unique way" (Castro, 2018, pp. 138–139). Such a conceptualization of language learning and learners also requires a move away from single-component/variable studies that explore, for instance, LLM or LLS in isolation toward research that examines how various learner and contextual variables interact together to create outcomes. A useful framework for exploring these interactions, specifically concerning LLM, is the model proposed by Yashima and Arano (2015), which combines a complex dynamic systems approach (Larsen-Freeman, 2012) with Valsiner's (2007) three-domain (microgenetic, mesogenetic, and ontogenetic) model of human development. As Yashima and Arano point out, both complex dynamic systems theory (CDST) and Valsiner's three-domain model view individuals as "dynamic, open systems" (p. 285) that interact with, and are connected to, multiple contexts (and other complex systems) of which they are a part (for a deeper discussion of a person-in-context relational view, see Ushioda (2009)).

Both CDST and the three-domain model see development, including that related to language education, as an emergent property of complex systems, where the interactions between individuals and their environment lead to the formation of new patterns of behaviour and understanding. When examining complex systems in language education research, there are two predominant, complementary approaches: dynamic-dominant and interaction-dominant (Hiver et al., 2021). The former is concerned with the processes of change, specifically focusing on relational dynamics, trajectories of development, self-organizing processes, and emergent outcomes. The latter, interaction-dominant research, emphasizes the complex underlying structure of interdependent relationships and interactions among system components. Several criteria are also used alongside these approaches within a CDST framework and can be broadly divided into operational (e.g., timescales), contextual (e.g., environment features), macrosystem (the stable state that a system may achieve over time), and microstructure considerations (e.g., as a complex system, the learner comprises subsystems, such as affect, cognition, and motivation, which facilitate their behaviour, whether this involves LLS, relationships with their peers and teachers, or performance on tests and assignments) (Hiver et al., 2021).

The unit of analysis is, likewise, a crucial aspect of CDST research and pertains to the level of detail at which studies are conducted, either at the individual or group level. The idiographic or individual-centered approach, which was used in this study, focuses on exploring the unique developmental trajectory of each individual, typically through an analysis of longitudinal data, while the nomothetic or variable-centered approach seeks to identify general patterns that apply across a group of individuals, often by analysing cross-sectional data (Verspoor et al., 2011). As for Valsiner's (2007) model, it complements the CDST framework and adds to it, first, due to its greater emphasis on how the boundaries between the individual and the context are mediated by cultural tools (in addition to environmental and contextual factors) and, second, by concretising the timescale aspect of CDST into three distinct levels (Yashima & Arano, 2015). In this way, it provides the study with a multi-layered sociocultural perspective that looks at how LLM, SEB, LLS, multilingual competence, and achievement interact, from daily experiences (i.e., the microgenetic domain) to structured

activities like attending weekly lessons (i.e., the mesogenetic domain) and deeply ingrained or internalized (over a long period) habits and values (i.e., the ontogenetic domain).

Regarding specifically the decision to focus on the links between LLM, SEB, LLS, and multilingual competence (which represent the trifecta of affect, cognition, and motivation), and their relationship with achievement in this study, one can refer to control-value theory (Pekrun, 2006) or the causal model proposed by Ramirez-Arellano et al. (2018). Control-value theory looks at how students appraise their control, or the control exerted by outside factors over outcomes (e.g., their achievement in exams) and the outcomes themselves (i.e., the value and importance they attach to them). These appraisals then influence the learner in terms of their LLS, affective state, cognition, and performance. Ramirez-Arellano et al. (2018), meanwhile, see interactions between motivation, affect, cognition, and achievement as both causal and reciprocal, underlining the need to study these variables (as represented by LLM, SEB, LLS, and multilingual competence in this study) together, rather than separately, when researching language learners. As already mentioned, there is a need for more research that captures the complexity of language learning experiences and LLM over time and in relation to other learning subsystems like cognition and affect, especially concerning languages other than English.

Language learning motivation, strategies, and self-efficacy beliefs

Since this study explored how university students' Arabic LLM interacted with their achievement, SEB, and LLS (all related to Arabic) over time, it is important to define the latter two concepts (i.e., SEB and LLS) and how they can affect (and be affected by) motivation within a dynamic systems model. Simply defined, LLS are "actions chosen by learners for the purpose of learning language" (Griffiths, 2020, p. 608). Beyond this simple definition lies a contentious theoretical foundation that draws on complexity and sociocultural theories (as this study does), behaviourism, and activity theory, among other elements (Oxford, 2011). Categorizing LLS has similarly been controversial (see Woodrow (2005)), with researchers suggesting different systems like six-factor models involving, among other things, cognitive-memory, formal-oral, and social strategies (Yang, 1999), as well as tripartite and four-factor models that generally consist of a combination of metacognitive, cognitive, and affective-social components (O'Malley et al., 1985; Schmidt & Watanabe, 2001). In the face of these approaches to categorizing LLS and the debates surrounding their validity, this study adopts Griffiths' (2013) suggestion of avoiding categorizing LLS until after analysis has been conducted on the data.

SEB, meanwhile, are "people's judgment of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura & Schunk, 1981, p. 31). A limited number of studies on the effects of LLS, LLM, and SEB on language achievement (perceived or actual) have been conducted (e.g., Teng et al., 2021; Yu, 2019; Zhang & Xiao, 2006), focusing almost exclusively on the learning of English and tending to be quantitative (i.e., using scales containing a priori categories to probe LLS and LLM) and cross-sectional (i.e., not exploring how LLM, LLM, and SEB evolve, including vis-à-vis achievement). Some of these studies indicate that LLM and LLS positively mediate the influence SEB has on achievement (regarding the learning of English) (Teng et al., 2021) while others show that they are weakly correlated and not

necessarily predictive of achievement (Tai & Zhao, 2022; Zhang & Xiao, 2006). These variations in research findings could be a result of, as already stated, the many different approaches to categorizing LLS adopted by researchers, the specificities of the English learning context (as opposed to Arabic or other languages), as well as the snapshot-in-time, questionnaire-based nature of most studies on LLM, LLS, and SEB, where interactions between participants and researchers are likely to remain restricted and may, therefore, not fully reveal the experiences of participants.

Where LLM, LLS, and/or SEB have been explored in relation to the learning of Arabic (and these studies number in the low single digits), the approach remains cross-sectional and questionnaire-based and limited to the group of countries where research on Arabic has traditionally been conducted (e.g., Malaysia and the Gulf States) (Adnan & Mohamad, 2011; Yang et al., 2018). The findings from such studies indicate that LLM, LLS, and SEB have a weak relationship with achievement or do not influence it.

Research questions

This study sought to contribute to research on the interactions between LLM, LLS, SEB, multilingual competence, and achievement vis-à-vis the learning of Arabic as a foreign language by exploring these variables over two semesters (i.e., an academic year). Specifically, the study sought answers to the following questions:

1. How do participants' LLM, LLS, and SEB change over an academic year? What factors do they identify as influencing these changes?
2. How does their multilingual competence affect their LLM, LLS, and SEB?
3. How do participants' LLM, LLS, SEB, and multilingual competence relate to their achievement?

Methods

Participants and data collection

Two university students participated in the study. The participants were female, in their early twenties, and learning Arabic as a foreign language at a Norwegian university (both were in the same course, which consisted of a roughly even split between Modern Standard Arabic (*Fusha*) and Levantine Arabic, also known as *Shami*. The participants have been given pseudonyms to ensure anonymity. Talia and Hilde spoke Norwegian as their first language, were proficient in English, and spoke other languages in addition to these two due to their mixed backgrounds (i.e., their parents did not share the same ethnicity): Talia spoke two languages from South Asia: Punjabi and Urdu, whereas Hilde was bilingual in English and Norwegian (one of her parents was English), and she also knew French and Spanish. Neither participant was a native speaker of Arabic, and both were recruited through teaching staff at a university in Norway where Arabic courses are offered. The staff arranged for an online meeting with students during which the project was presented, and its parameters were discussed. Students were encouraged to volunteer for the project, which required them to commit to weekly meetings (online semi-structured interviews) over two semesters. Specifically, the project consisted of

individual semi-structured interviews during the fall and spring semesters, covering the first year of Arabic that the students took (i.e., from August to May).

The first interview with each participant lasted 60 min and elicited sociobiographical information (place of birth, early life, education, etc.), reasons for studying Arabic, desired proficiency in the language, current Arabic language ability, prior experiences with learning Arabic and other languages, travel to the Middle East, multilingual competence, level of motivation to learn Arabic, LLS, course materials, activities, and structure, support from parents, and class environment (e.g., relationship with teachers and classmates). The subsequent weekly interviews lasted around 15 min on average, took place at the end of each week, and followed a guide that covered their LLM (e.g., How motivated did you feel this week to learn Arabic? Were there any changes in your reasons for learning Arabic?), LLS (e.g., How did you learn Arabic this week in class? What did you do? What about outside of class?), including being asked to talk about drawing on their multilingual competence (e.g., How did your knowledge of other languages help you?), and SEB (e.g., Have you noticed any changes in your ability to read Arabic this week?). Given that motivation is linked to the evaluation and satisfaction of need states (Reeve & Lee, 2019), it can change at the level of specific needs (e.g., some needs may be replaced by others over time) *and* vary in intensity (Yashima & Arano, 2015). SEB are similarly subject to variations in strength (Piniel & Csizér, 2015).

As such, the participants were asked to note down changes in their motivation and SEB during the week, both in and outside of the lessons, and reflect on these during the end-of-week interviews using ratings corresponding to a five-point 'very high/positive – very low/negative' scale. These reports were then used to plot motivational/SEB temporal trajectories for the participants to see how these fluctuated throughout the two semesters from week to week and month to month (and to discuss these fluctuations with them; see Figs. 1 and 2). Similar trajectories have been used in previous LLM studies (Henry et al., 2015; Yashima & Arano, 2015) and help participants think more deeply and systematically about the language learning process, as well as aid researchers

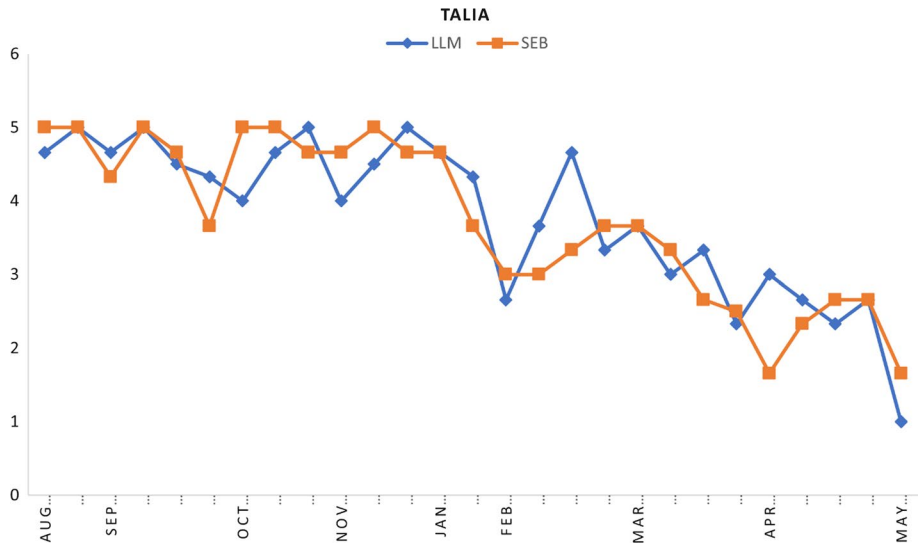

Fig. 1 Talia's motivational and self-efficacy beliefs trajectory regarding Arabic over an academic year

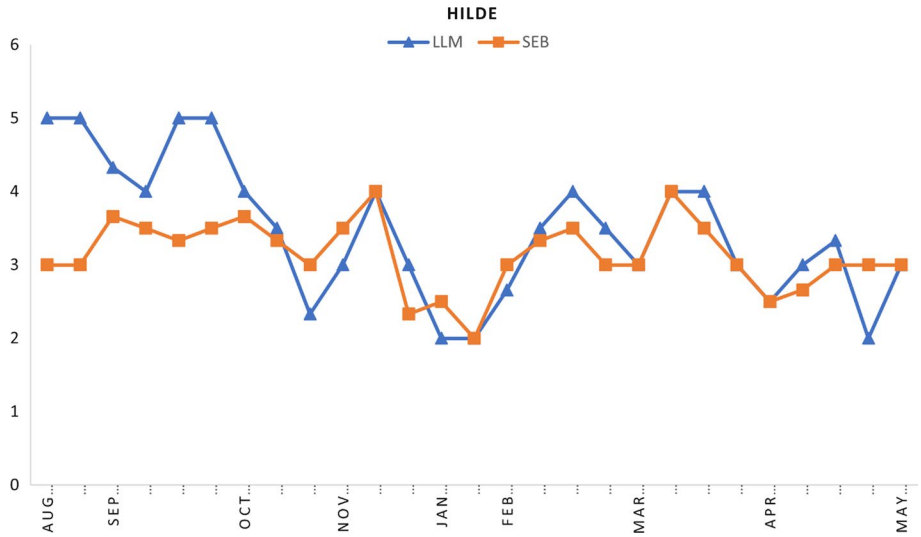

Fig. 2 Hilde's motivational and self-efficacy beliefs trajectory regarding Arabic over an academic year

in obtaining more comprehensive insights into the process. All the interviews were recorded, both audio and video, and conducted primarily in English. End-of-semester exam scores (letter grades) were also collected as part of the study (two scores in total, one each from the fall and spring semesters) and post-exam interviews (once participants had obtained their grades) were held with each participant to discuss any changes to their LLM, LLS (i.e., if they had decided to change strategies), and SEB (see Additional file 1: Appendix A for the interview and exam outlines). The post-exam interviews were of similar duration (i.e., around 15 min) to the weekly interviews.

Data analysis

The semi-structured weekly interviews were transcribed and then analysed using Atlas.ti software. The overall approach to coding was to understand the complex experiences of participants while also drawing on theoretical knowledge to organize these experiences. In terms of theoretical knowledge, this meant taking participants' responses and organizing these in relation to need states when it came to examining their LLM (e.g., learning Arabic to improve career-specific competences, wanting to help integrate refugees from Iraq and Syria into Norwegian society, interest in Arabic calligraphy, need to learn vocabulary rapidly, etc.), including for need strength, desire, value, and/or importance (Reeve & Lee, 2019). The study ultimately categorized participants' LLS responses based on Oxford's (1990) six-category LLS taxonomy (memory, cognitive, compensation, metacognitive, affective, and social strategies) while also considering the approach synthesis to LLS classification suggested by Hsiao and Oxford (2002): (1) differentiating between language use and language learning strategies, (2) understanding that certain strategies can belong in more than one category, (3) paying attention to precise versus general statements about LLS use (i.e., strategies to improve extensive reading ability versus statements about developing general reading skills), and (4) noting down the specifics of tasks that participants reported doing.

Multilingual competence (Jessner, 2008) was operationalized as any explicit indication that participants used the other languages in their repertoire or associated learning experiences as resources when learning or using Arabic (e.g., being able to write in Arabic with little effort because of having developed literacy skills in Urdu, which uses a modified Arabic script). The interview data touched on participants' multilingual competence as a component of their LLM, LLS, or SEB in several instances (and these instances were coded accordingly and included under LLM, LLS, or SEB). Regarding the overall procedure, the interview data were read and coded chronologically (and the time sequence was preserved throughout to track changes in participants' LLM, LLS, and SEB over weeks and months), with subsequent readings that led to codes being refined, combined, or removed. The codes were placed in the LLM, LLS, and/or SEB categories and further grouped under subcategories (the classifications for LLS are discussed above; for SEB, responses were grouped under the four language skills—reading, writing, speaking, and listening—and knowledge of vocabulary and morphosyntax; multilingual competence, as already mentioned, was not

Table 1 Coding procedure for participant interviews

Week	Student	Data	Domain	Category	Subcategory	LLM	SEB
39F	Hilde	The teachers make Quizlet sets [1] for each of the vocabulary lessons. It's good [2] because you see the word as well as you could say it out loud [1]. I like [2] to combine seeing the word and hearing it and saying [1]. I find, especially when it comes to the vocab stuff, like, since I have had, like, zero experience, no experience with Arabic previously [3] or any other similar language [3], there is no overlap with vocabulary [3], and so I find that the only way for me to remember [4] is either to basically look at it many times and listen to it [1]	[1]Mesogenetic [2]Mesogenetic [3]Ontogenetic [4]Mesogenetic	[1]LLS [2]LLM [3]SEB [4]SEB	[1]Memory [1]Cognitive [1]Metacognitive [2]Digital Tool [2]Vocabulary [2]Affect[+] [3]MC [3]Vocabulary [4]Vocabulary	5	3.3
7S	Talia	I got like the ding feeling in my head [1,3] where I feel like 'oh it makes sense' [3] and I just really got into it [1]. Sometimes I feel like I know a lot of Arabic [3] and feel like if you put me in an Arab country, I would be able to survive or whatever [3]. Like I was watching some music with my cousin, and I was like 'in Arabic, it would be this and this' [2]. Sometimes I am very engaged [1]. And I just translated everything that we were hearing and seeing [2]. Sometimes it's fun [1] and other times I wonder if I've learned any Arabic at all [1,2,3]	[1]Microgenetic [2]Microgenetic [3]Microgenetic	[1]LLM [2]LLS [3]SEB	[1]Affect[+] [1]Affect[−] [1]Cognition [2]MC [2]Cognitive [2]Metacognitive [3]General [3]Listening [3]Speaking	4.7	3.3

F fall; *S* spring; *SEB* self-efficacy beliefs; *LLM* language learning motivation; *LLS* language learning strategies; *MC* multilingual competence

assigned its own category, so its associated codes appeared across the three main categories of LLM, LLS, and SEB). Table 1 provides an example of the coding process.

The interview data were also coded to determine whether participants' experiences corresponded to the microgenetic, mesogenetic, or ontogenetic domain, based on Valsiner's (2007) model (see Table 1).

Results

Analysing the data revealed notable differences in how Talia and Hilde's LLM, LLS, SEB, and multilingual competence evolved over the two semesters and across different timescales, from microgenetic to ontogenetic. The data presented in this section have been chronologically organized per participant since each represents a complex system. Figure 1 charts Talia's LLM and SEB trajectory over an academic year, based on the 5-point scale responses that were collected every week over the two semesters (see "Data analysis" section), and Fig. 2 does the same for Hilde.

Talia

Talia was born and raised in Norway, though she had moved to Pakistan for one year as a child where she attended first grade at a private English-medium school. Her English language skills grew rapidly during the year, as did her Punjabi, which she used with her grandparents since "they don't speak anything else". On returning to Norway, she started attending Urdu Sunday school on weekends. During her stay in Pakistan, she had "forgotten quite a bit of Norwegian" and had to relearn it when she returned to Norway, which she did rapidly, noting that she was "good at languages". In secondary school, Talia chose to study Spanish and acquired basic knowledge of the language ("enough to say basic phrases", as she put it). After graduating, she selected to major in political science at university and decided to learn Arabic to complement her focus. She said that it had been her wish to learn Arabic for a very long time for religious and professional reasons. Ultimately, she wanted to work in an embassy where she could use her Arabic skills. In terms of support from her friends and family, she reported that her family did not interfere in her plans, which she found encouraging, and that her friends had found it curious that she had opted to study Arabic. She said that for them, it (i.e., studying Arabic) would have been easier to understand if she were Arab or from a purely Norwegian-speaking household because then she would have had a more monolingual or heritage language background and it would make sense that she wanted to learn other languages.

However, because she already spoke so many languages, they felt that it was interesting that she wanted to learn even more. She stated that they meant this positively, adding, "You will find Arabs or Norwegian students taking Arabic. Other ethnicities are not represented." Talia reported her motivation and SEB as generally very positive during the weeks and months that comprised her first semester of Arabic (i.e., from August to November). For the weeks from August to mid-November, for instance, she consistently described herself as ambitious and excited to learn Arabic, stating that she was "picking up a lot of things very fast" during the lessons, which were alphabet- and vocabulary-focused, and that there was quite a bit of speaking practice. She

felt that her Arabic lessons were much easier than when she had to learn the Quran, which she did as a child. She was already familiar with the Arabic script, both because of having read the Quran and due to her knowledge of Urdu and Punjabi. Commenting on the ease with which she was learning new words during this time, she would note that she was doing it "blindly" or "with eyes closed". She said she liked her teachers, whom she described as "very helpful, very cool, and laid back, no pressure". Her opinion of them would remain consistent throughout both semesters. She said that they mostly used Arabic and English as the languages of instruction during classes.

Asked for specific strategies, she reported using Quizlet vocabulary lists to retain content that she was learning, watching movies in Arabic, listening to Arabic songs, going to language cafés to speak with Arabic-speaking immigrants, and through her work at ForexBank, where she tried to use Arabic with customers. Describing her approach to interactions, she said, "I have no shame in speaking Arabic with strangers. I just, like, eat their brains." She revealed that the course followed a flipped classroom format that involved memorizing vocabulary from the Al-Kitaab textbook and then doing language skill drills in the classroom, often with a partner. She also mentioned that Spanish helped her understand Arabic vocabulary because of similarities in how the two languages handled gender and suffixes/prefixes, though new words were sometimes difficult to pronounce at first without the presence of diacritics. These learning experiences formed a repetitive, predictable loop throughout the first semester, representing a primarily mesogenetic process with stable, positive motivational and SEB throughout and a B grade on the exam. The following semester, starting in January, brought a greater focus on grammar to Arabic lessons, which Talia said she struggled with. This change, she observed, had dented her motivation and SEB, although another factor had a much larger, negative impact on her motivation and SEB: her friend dropped out of Arabic.

She explained that having her friend with her meant that they joked in class together using Arabic and learnt a lot in this way (i.e., by playing with the language). Her friend quit the Arabic course because she had not received a good grade in the previous semester. During an interview in early February, Talia expressed surprise at how "Arabic has a lot of grammatic structures". Previously, when asked about her multilingual competence, she stated how her experience reading the Quran and knowledge of Urdu, Punjabi, and Spanish had helped her learn vocabulary. Now, she felt that her languages were not helping her. Asked why she thought so, she replied that she did not remember grammar rules in Norwegian, English, Urdu, Punjabi, or Spanish and had some trouble with academic content in general. Mid-February brought a short-lived increase in her motivation when, during Week 7, she reported watching a music video with her cousin and started translating it into Arabic for him. She said that she realized that she knew much more Arabic than she thought, describing it as a "'ding' moment in her head". From mid-February to mid-March, Talia noted that she did not feel like she was making as much progress as she had during the previous semester. She said that the course had "become more theoretical" and that "grammar is no longer fun and easy".

Asked how she measured her progress, she answered that she did not do so systematically; instead, she relied on how well she did in listening comprehension and translation activities, as well as how comfortable she felt doing tasks. When questioned about potential changes to her strategies, she responded that she had started to talk to herself

in Arabic aloud, imagining what she would say to people when visiting Lebanon. She said she liked to play scenarios in her head because she possessed limited avenues for interacting with Arabic speakers and wanted to work on her proficiency in Shami:

> *I don't have any friends who speak Arabic. Just some cousins in Iran who studied Arabic but only Fusha. I can speak with them and seek their help but only for Fusha. But I am learning both Shami and Fusha and it's difficult because it's like learning two languages.*

She added that she had stopped watching Arabic movies because they required a lot of time but continued to listen to Arabic songs. She said that she remained an active participant in lessons though she was not as quick with her words:

> *We speak a lot and activate what we learn at home and in class. Everything comes out slower and you are a bit shy, and it might sound very wrong. I have to take a step back and am not very comfortable speaking Arabic out loud because I might sound stupid.*

In early April, that is, in Week 14, Talia reported that her motivation to learn Arabic had changed after a conversation with her brother:

> *I wanted to work in an embassy, but I think it was too high to aim for and something that did not have a purpose, like, I would do paperwork at some office. There are also a limited amount of workplaces in embassies, competition is high, you need a good network, a good academic background. I feel I don't have these. I don't think I can compete.*

She said that she now wanted to work with Arabic-speaking immigrants in Norway and help them integrate, to "reach out to minority populations struggling with being understood". She had also found work as a part-time teacher in a primary school. Asked about her progress in Arabic, she said that she was "struggling with grammar and falling", adding "I don't know if I can make it to exams". She said that she was afraid that classes would end, and she would "forget Arabic or fail to integrate it" into her identity, adding that she still wanted to be fluent in Arabic. Asked if she would continue with Arabic the following semester, she said that she could not risk a bad grade, which for her meant anything below C, because that would reflect poorly on her primary focus (i.e., her political science major) at university. From mid- to late April, Talia reported dropping levels of motivation and little interaction in Arabic during lessons. Exams were coming up and she was anxious. She had started speaking Arabic with some of her students in primary school and would "try to pass myself off as Arab", adding that the students were fascinated with her. This put her in a good mood, though she made grammatical errors, and this kept her motivation and belief in her abilities "somewhere in the middle".

In her final post-exam interview, Talia reported that she received a D in the Arabic exam, which was held online. She said that her motivation had plummeted and that she could not continue with the subject, "It was disappointing because I was very excited and spent a lot of time and energy and then I got a low grade." She said that her motivation was also negatively impacted when she learnt that a classmate that she looked up to because "he participated in the class, knew a lot, and contributed a lot to the class and

environment" also got a D. She was shocked because she saw him as one of the strongest students in the course. When asked what she planned to do with Arabic now, she responded that she might study it independently. She had expected at least a C on the exam and was surprised that she did better in grammar (78%) than in vocabulary (59%), which involved composing a speech to a friend about what they could do in Oslo on a visit and writing a story based on a series of pictures. She said that 49% of the class received a C, 4% received an A, and 19% a B, while the rest received Ds, Es, or failed. After the exams were over, she said that she still listened to Arabic songs, used Quizlet, and had downloaded Duolingo, but not much else.

When asked how well she thought the exam reflected her progress, she replied that learning Arabic required group participation and that "the final exam should be replaced by small tests during the semester to give a final grade", with the composite score counting as the final grade. She said that the grade did not reflect participation and that she would like to continue with the Arabic course "without being graded", stressing, "I just want to learn".

Hilde

Hilde described herself as "half-English and half-Norwegian". She said that she had always been interested in Arabic language and culture and was doing a joint degree in religion and Middle Eastern studies. She had previously wanted to pursue a degree in music. She was born in Scotland and had moved to Norway when she was three. She reported speaking English with her mother and Norwegian with her father and brother. She said that since all her schooling had been in Norwegian, she knew more vocabulary in Norwegian than in English. She had studied French in secondary school for five years but revealed that she "hardly remembered any of it". Like Talia, Hilde reported high motivation in the weeks between mid-August and late September, followed by a dip from mid-October to mid-November, due to a mix of personal circumstances and because the "grammar started". On the contrary, her reported SEB during these weeks remained stable and slightly increased. Unlike Talia, Hilde had no prior exposure to Arabic, nor did she know a language that had anything in common with Arabic (she, like Talia, was learning Fusha and Shami together). As such, Hilde reported having to do a "lot of work, more work than other subjects because there are lots of physical meetings, and attendance is mandatory, and lots of homework". She said that she did not mind the workload because it was new and fun.

In an interview from Week 39 (September), commenting on the classroom environment, she said that she felt motivated because her classmates seemed interested to learn the language and the teachers promoted interactive learning, "trying to trigger the brain to remember". When asked what strategies she used, she said that she practised vocabulary by looking at the words, then listening to the CD accompanying the textbook, and completing exercises in the textbook. Like Talia, Hilde also used Quizlet. She said that the alphabet was difficult to learn and that she did not "find knowing Norwegian, English, and French useful to learn Arabic". During her exam for the fall semester, Hilde received a C, which did not dent her motivation to learn Arabic. In an interview following the exam, she said that one of the activities had been to write about oneself and she thought that it "was cool to write a whole page" in Arabic. From the middle to the last

week of January, in the new semester, Hilde reported low motivation and SEB. These were due to two primarily microgenetic factors. First, she learnt that quite a few students were no longer going to attend class and so there were fewer people with whom she could interact. The atmosphere had changed from where students seemed interested to one where she felt "the focus has shifted to pass the subject".

She had also downloaded an application over the holidays to speak to people in Arabic, but it had been difficult to find individuals who were genuinely interested in helping her improve. When asked if she was handling Arabic grammar better, she responded that they had a new teacher who had a softer approach to the students, which was very welcome because she needed time to understand, adding that "it takes a lot to see that I am improving". She commented that after learning a language for a while, "the novelty starts to wear off, but I know I am going to stick with it until the end". When asked if her motivation to learn Arabic had changed, she said that she remained very interested in the Arabic language and culture and that a strong motivator for her would be to go and live in the Middle East for a semester or so and use the language daily in authentic situations. In February, her motivation and SEB rose. In Week 6, Hilde said that during class on Monday, they had started revising something they had already covered, which helped her feel that she was in control again. She said that they had a reading task following the revision and that "even if I didn't understand the whole text, I breezed through it". She added that her classmates also had problems with the text and that this also motivated her because she did not feel alone. She liked that "roughly everyone is similar in ability".

Later in the week, it was less motivating. She had to produce a short story using keywords and was assigned an uncooperative partner so she felt that she did not perform as well as she could have. In Week 7, Hilde reported that a friend had moved to Italy and was learning Italian. She said that they had started doing Quizlet together and tried to guess words in Arabic and Italian through online video chat. She felt it was enjoyable to practise this way with a friend and "not just mindlessly doing exercises on Quizlet". She said that she was still struggling with grammar, especially identifying the roots of words and conjugating the different verb forms, but that vocabulary had become easier to remember. She said that she could not understand grammar and why sentences "are built the way they are". When asked whether her knowledge of other languages could help her with Arabic grammar, she replied that French helped to some extent:

> *Knowing grammar terminology, like 'past tense,' is useful… one has similar things, and it [French] helps to think about Arabic in a certain order but not beyond that. Some things are alien concepts, like fronted predicate. There's nothing to relate to that. Norwegian is worse, though. I have no idea about grammar. I felt like I knew English but now that I think about it, I never paid attention to why things are the way they are. So now I am struggling.*

She stressed that her focus was now on vocabulary because "the more one can remember, the easier to speak it will be". In Week 8, Hilde reported downloading shows (children's programs) in Egyptian Arabic with English subtitles. She thought it could improve her pronunciation and ability to follow the "flow of sentences". However, she commented that the Egyptian dialect was "difficult to understand beyond simple things" and that her knowledge of Fusha and Shami did not help, which

demotivated her. She joked that she was "scared to have to talk to someone who speaks Egyptian". On Thursday of that week, she asked her teachers for help with listening (based on her experience with the shows) and vocabulary strategies. She reported being told to listen to the shows several times, first to get the gist, then in greater detail, followed by pausing the video from time to time. She concluded that "the more we do it, the more we'll get used to it". For vocabulary, she was told that Quizlet was good at first but could become monotonous, so she should write down unfamiliar words and listen to them frequently, say them aloud, and "use more of her senses to remember the words". This motivated her to look for a program online that would help her do this. She found MATC (Media Arabic Text Collection) on the Internet, a Web-based project that purports to help with Arabic reading and comprehension skills.

The project, which she said boosted her motivation but also showed her how limited her vocabulary was, contains several Arabic media texts with explanations for syntax and vocabulary, as well as translation and audio features. She said that the translation function was useful, though the syntax information was limited. She read the translation of the texts first, then the texts in the original, reading them in her mind and then aloud. She discovered she had "to go through each letter to figure out the word" and that it was "difficult to look at the word and recognize it". She revealed that she had started learning Spanish using Duolingo and could recognize and read words much more rapidly in Spanish (even though she understood little) than she could in Arabic. In early March, her attempts to research new ways to learn vocabulary continued. She said that she was trying the Pimsleur Arabic course and was working with a teacher to learn a song in Arabic, which motivated her more to learn the language. She reported that classwork followed a similar pattern of being introduced to new vocabulary and grammar content and then doing exercises, including listening to sentences, making sentences with unfamiliar words, matching pictures with the words, and translation, adding that her motivation had become more stable during classes because of the predictable lesson format.

The end of March and the beginning of April saw a fall in Hilde's motivation and SEB. She said that she was "getting stressed about the exam" and that she had begun to revise for it. She mentioned focusing on vocabulary and writing. She made mind maps for vocabulary thematically and then thought of words with which to fill the maps, something she found helpful. Writing practice consisted of writing out pieces of text, which she felt made her "become aware of form, like endings, grammar things, aware of breaking down words". She stated that through practicing her writing she had decided that she loved calligraphy. Hilde continued to use MATC but had also found two other programs that she thought were useful: Kaleela and Google Read Aloud. She rated Kaleela, which is a mobile application that helps learners improve their knowledge of Arabic dialects, as being better than Duolingo, observing that the sentences made more sense. At the same time, she said that her knowledge of Fusha did not help her fully understand the various dialects the application contained, especially pronunciation. She was very positive about Google Read Aloud, which allowed her to slow down the speed during read-alouds, letting her hear the vowels and marking them down in the text. She said that her pronunciation had improved but she still

struggled to read on her own. She reported that she used the application "sometimes for 10 min to an hour, every other day".

Her work with a teacher on an Arabic song continued and she had been told that her pronunciation of the lyrics had improved, though she said that it had not boosted her motivation. It had made her realize, however, "how unsure I am of sentence structure in Arabic compared to the other languages I know". Hilde received a C on the exam, saying that she was not "super upset, but it could have been better… I was hoping I would get a better grade". She felt that "most parts [of the exam] were a struggle" but that the listening and grammar activities had been particularly "annoying". Asked if she would continue, Hilde responded in the affirmative, saying that she remained very interested in Arabic.

Discussion

Before proceeding to a discussion of the findings (these have been organized under three subsections based on the study's research questions), it is important to state here that this study is one of the first to have investigated LLM regarding Arabic as a foreign language in Europe by combining dynamic systems and sociocultural approaches to cover multiple variables such as participants' SEB, LLS, and multilingual competence across different timescales. At the same time, the findings are far from being generalizable to all language learners or learning contexts due to the small number of participants in this study versus the diversity of learner profiles that one can encounter in foreign language classrooms globally. This limitation notwithstanding, the findings do hold several implications for LLM research, as well as language learners and teachers, regardless of context (see "Conclusion" section).

Changes in participants' LLM, LLS, and SEB and associated factors

The findings indicated that each participant's motivational and SEB trajectories followed unique patterns even though they were taking the same course. For instance, Talia's motivational and SEB trajectories witnessed a visible, terminal, downward cline starting in mid-February (see Fig. 1), with her motivation and SEB dropping notably toward May from when she began in August (if one compares the starting and end points). On the contrary, Hilde's trajectories either remained around the same levels (e.g., see her SEB) or fell, though not to the same extent as Talia's. Both participants' LLS remained quite stable, albeit certain activities were used less frequently over time as motivation fluctuated or decreased (e.g., Talia's decision to stop watching Arabic movies, attending language cafés, etc.). There were also some consistent differences between the two participants in the general thrust of their LLS. For Talia, her strategies were largely focused on communicating with others (e.g., by talking to customers at ForexBank, to her students as a part-time primary school teacher, to her friend before she dropped out, to herself by imagining what she would say to people when visiting Lebanon, or translating for her cousin) and Quizlet, the latter of which formed part of her efforts to retain vocabulary acquired during lessons (she also worked on activities from the Al-Kitaab textbook, though that was something that all students were required to do).

As such, her LLS could be categorized as comprising mostly social strategies (Oxford, 1990), which reinforced her motivation (i.e., to work in an embassy and

then later to work with immigrants), and some metacognitive (e.g., seeking out people to talk to, evaluating her listening comprehension and translation ability as signs of progress), memory (e.g., reviewing lessons, physically acting out conversations, and Quizlet), and cognitive strategies (e.g., watching Arabic movies and listening to songs). She also strongly relied on her multilingual competence in the first semester, for instance, her experience with learning to read the Quran, as well as her knowledge of Urdu, Punjabi, and Spanish (more on this below). Concerning affective strategies, it appeared that she only used one, which was to evaluate her progress based on how comfortable she felt. Hilde, on the other hand, had a much larger repertoire of LLS (albeit used her multilingual competence much less) that covered memory (e.g., using Kaleela and *singing* songs in addition to what Talia reported doing), cognitive and metacognitive (similar to those implemented by Talia, although Hilde also reported using more digital resources such as Google Read Aloud, Pimsleur, and MATC, and consistently looked for ways to improve her vocabulary knowledge), social (these were not as varied as Talia's and primarily consisted of an aborted attempt at finding people with whom to communicate by downloading an application and doing Quizlet with her friend in Italy), and compensation strategies.

Interestingly, neither participant made strong use of affective strategies (e.g., positive self-talk), which is unsurprising since these strategies, as a group, tend to be the least used (Oxford & Crookall, 1989). Overall, each participant's LLM and SEB followed analogous trajectories, suggesting, as other studies have pointed out (e.g., Teng et al., 2021), that the two (i.e., LLM and SEB) are related, although at certain points in time they differed notably (notice the differences in Hilde's LLM and SEB in mid-September and for Talia's in mid-February; see Figs. 1 and 2). Cross-sectional studies, if they had been conducted during these periods, would have reported quite different results for the relationship between LLM and SEB than if they had been carried out in other periods. As for the factors that influenced their LLM, LLS, and SEB, these also existed in different domains for each participant. For instance, Talia's LLM and SEB trajectories appeared to be most susceptible to microgenetic factors. A conversation with her brother led to her entirely changing her LLM (as part of a broader career strategy) from an embassy job to work that involved integrating immigrants into Norwegian society. Meanwhile, her friend's decision to leave the Arabic course had a markedly negative impact on her Arabic LLM, as did the D she received in the exam, precipitating her decision to drop the course.

Positive microgenetic events like her 'ding' moment when translating to Arabic for her cousin were quite limited, in contrast. Occurrences at the mesogenetic level like using Quizlet, doing activities from the textbook, listening to Arabic songs, and interacting with others through work at ForexBank or primary school appeared to affect her LLM and SEB either mildly or very positively, yet seemed insufficient in altering the effects of the negative microgenetic occurrences mentioned above. Her LLS, as already mentioned, remained quite constant though she engaged in fewer activities after her low exam grade in the spring semester (an event in the microgenetic domain). In the ontogenetic domain, her multilingual competence and desire to integrate Arabic into her identity had a positive impact on her LLM and SEB in the fall semester, though this impact turned negative in the spring semester and served to

demotivate Talia and led her to doubt her abilities as a multilingual learner. For Hilde, her LLM and SEB drew primarily from factors in the mesogenetic domain linked to her LLS like working with numerous digital resources, with or without friends. These appeared to support her LLM and SEB from significant drops, even if they made her reflect on how much ground she still needed to cover to learn Arabic (i.e., they made her reflect on her abilities and did not demotivate or cause her to discontinue using the applications or forego the LLS she had implemented).

Microgenetic events, too, such as receiving a lower grade than expected in the exam or peers dropping out of the course, had little long-term impact on Hilde's LLM and SEB. Talia seemed much more affected by these occurrences in terms of her LLM, LLS, and SEB. At the ontogenetic level, Hilde's interest in the Middle East remained consistent throughout both semesters, whereas her multilingual competence played a limited, generally unchanging role in her learning process. This brings us to the second research question.

The effects of multilingual competence on participants' LLM, LLS, and SEB

As already stated, for Talia, her multilingual competence had a strong, positive effect on her LLM and SEB in the first semester, during which learning the Arabic script and vocabulary took precedence over grammar. Here, due to her knowledge of Urdu, Punjabi, and Spanish (despite these being Indo-European languages and not Semitic ones), and her reading of the Quran, she was able to progress "with eyes closed" in a way that Hilde reported that she could not. Hilde knew exclusively European languages and felt that these did not help her with Arabic, limiting the LLS she could implement. These findings support those of other studies where knowing languages that share elements with the language being learnt can make the learning process easier (e.g., Ringbom, 2007). More importantly, however, the findings indicate that multilingual competence *can* boost LLM and SEB but that much depends on what *kind* of multilingual competence the learner possesses (i.e., its effectiveness is context-specific). For instance, in the spring semester, Talia's multilingual competence did not prevent her LLM and SEB from dropping since her competence did not cover increased morphosyntactic awareness in the languages she knew (it primarily comprised familiarity with the script and vocabulary). Hilde, likewise, reported difficulties using her multilingual competence to learn Arabic, especially grammar, linking it to difficulties making sense of grammar in the other languages in her repertoire, though she felt that knowledge of grammar terminology from French helped to some extent. Studies indicate that when teachers possess weak morphosyntactic awareness regarding the languages in their repertoires, it affects their ability to draw on their multilingualism as a resource when teaching (e.g., Calafato (2021b)). The findings of this study indicate that the same phenomenon occurs with learners and their ability to learn multilingually.

The relationship between participants' LLM, LLS, SEB, multilingual competence, and achievement

Finally, concerning the third research question, the findings showed that their LLM and SEB trajectories were predictive of their exam scores. In Talia's case, high LLM and SEB preceded a B grade in the fall semester exam while lower LLM and SEB were witnessed

prior to the D she received for the spring semester (see Fig. 1). Her multilingual competence was similarly seen by her as helpful in the spring semester and ineffective in the fall. As for Hilde, despite fluctuations, her SEB and LLM trajectories remained quite stable (see Fig. 2), similar to her exam grades in both semesters (i.e., she received a C). Her multilingual competence helped her in neither the first nor second semester and had a negligible impact on her exam scores (since she was unable to use it over the year). At the same time, regarding participants' LLS, the findings indicate that these may not have significantly affected their achievement. For example, Talia's LLS varied little between semesters, even if that did not prevent her from receiving a weaker grade in the spring semester. Hilde, in contrast, diversified her LLS over time (i.e., she used more of them) yet received the same grade (i.e., C) in the fall and spring semesters, implying that greater variation and/or sustained use of LLS does not translate into better exam performance, at least in this study. The findings on the positive relationship between LLM, SEB, and achievement have been documented in cross-sectional studies like Teng et al. (2021), although this study is one of the first to document these longitudinally in relation to learning Arabic as a foreign language in tertiary education.

Conclusion

Learning languages that are distant from the ones we already know can be a challenging endeavour, with strong implications for our motivation, SEB, LLS, and achievement over time. For teachers, whether in schools or tertiary education, the findings of this study indicate the importance of keeping track of not only learners' achievement over time, which is formally done through tests, exams, and tasks, but also their LLM and SEB, which are not necessarily systematically or regularly assessed and can be difficult to observe in the classroom. Yet, they do seem to be harbingers of achievement and so should be tracked more methodically by teachers. In concrete terms, this means either directly asking students about their LLM and SEB levels at fixed intervals during the academic year or having them fill out a very brief (one- to two-minute long) scale-based survey, either in print or online, at the beginning or end of lessons. The importance of continuous assessment in this way would be to help teachers consistently follow each student's LLM and SEB trajectories over days, weeks, and months, and not through random conversations that may or may not occur throughout the year, which could give them a misleading perception of their students' LLM and SEB. Such assessments would also give them a broader overview of how their student groups will perform going forward (especially in exams), enabling them to better predict challenges in advance and take remedial measures to pre-empt them.

For instance, had Talia's Arabic teacher tracked her LLM and SEB trajectories, as was done in this study, she may have been able to find solutions to her weakening LLM and SEB and prevented the student from dropping out. She could have recommended digital resources for Talia or provided her with customized tips and LLS to aid her in improving her progression in the areas in which she felt the weakest. Indeed, teachers should think about how the use of digital resources for Arabic can be expanded since these appeared to support LLM and SEB to some extent for Hilde, who used them extensively (whereas Talia did not). For researchers, the study's findings underline the risks of conducting

cross-sectional LLM research to the extent that such research might not be relevant the day or week after and thus could not be used by teachers or educational institutions to implement appropriate measures in support of students' language learning. If cross-sectional research is done, researchers should consider a timescale-orientated approach to constructs, which many frameworks (e.g., L2MSS and the focus on multiple selves) do not explicitly account for (at least not based on how these frameworks have been operationalized in studies).

This study also shed light on multilingual competence, which is strongly being promoted in the current education landscape, as it applies to learning distant languages (i.e., from those in one's repertoire), and how it relates to LLM, LLS, SEB, and achievement. The findings showed that not all manifestations of multilingual competence (e.g., where that competence does not include developed morphosyntactic awareness) support or sustain LLM or SEB beyond an introductory phase, at least when it comes to learning languages that share little in common with the ones we already know. For teachers and educational institutions, this means being more precise in the types of multilingual competence that are promoted among learners, accompanied by deeper reflections on their context-specificity. According to the findings of this study, for instance, teachers should strive to develop multilingual competence with a strong emphasis on morphosyntactic awareness in learners already in the Norwegian (i.e., the first language) classroom (i.e., in primary education), perhaps by drawing explicitly on grammar differences between the various Norwegian dialects or comparing Norwegian with English in a way that goes beyond merely translating vocabulary. This could help learners better and more systematically understand the variations they see in *Arabic* dialects and Fusha should they decide to learn these in the future and build up their multilingual morphosyntactic awareness in general.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s40862-023-00194-5.

Additional file 1. Appendix A: Interview outlines and exam format.

Acknowledgements
Not applicable.

Author contributions
For this academic article, there is only one author, and therefore, the author is solely responsible for the conception and design of the study, acquisition and analysis of data, interpretation of results, and drafting and revision of the manuscript. The author confirms that they have read and approved the final version of the manuscript and have agreed to be accountable for all aspects of the work.

Funding
The authors received no financial support for the study.

Availability of data and materials
The data supporting the findings of this study are available upon request from the corresponding author. The data are not publicly available due to their containing information that could compromise the privacy of the research participants.

Declarations

Ethics approval and consent to participate
Participants were informed of the study's purpose, procedures, potential risks and benefits, and their right to withdraw at any time. All participants provided their informed consent in writing before the study commenced, indicating their willingness to participate in the research. The confidentiality and privacy of the participants were protected throughout the study, in accordance with ethical guidelines.

Consent for publication
Not applicable.

Competing interests
There are no competing interest to declare.

Received: 10 September 2022 Accepted: 9 March 2023
Published online: 07 July 2023

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