



Using Infographic Narratives to Investigate Undergraduate Students' Disciplinary Literacy Development: An Innovative Narrative Inquiry Approach for English-Medium Education Contexts

運用資訊圖表敘事探討大學生學科素養發展：英語授課教育情境中的創新敘事探究法

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Abstract

The vast growth of English-medium education (EME) worldwide has drawn substantial scholarly attention. Recently, a growing number of studies have addressed how students develop the disciplinary content and language required for navigating EME programs, conceptualized as disciplinary literacy (DL in EME; Dafouz et al., 2023, see also Airey, 2011). However, few have foregrounded students' perspectives on their disciplinary literacy development (Dafouz et al., 2023). This study argues that narrative inquiry, defined as “the study of experience as story” (Clandinin & Connelly, 2006, p. 477), is a valuable approach to students' lived experiences, providing nuanced insights into the complex processes involved in DL development within EME contexts and making it possible to construct trajectories without extensive longitudinal data collection. For this study, four detailed student narratives were constructed from extensive semi-structured interviews with final-year undergraduate EME students in Austria. These narratives reveal key developmental factors and phases, phase-dependent challenges, effective teaching practices, and the importance of curriculum design in supporting the development of disciplinary literacies. Furthermore, this study demonstrates the potential of narrative analysis (Benson, 2013, 2018; Polkinghorne, 1995) and presents infographic narratives as an effective method of representing students' “DL in EME” trajectories.

摘要

全球英語授課教育 (EME) 的蓬勃發展已引發學術界的高度關注。近年來，越來越多研究探討學生如何發展在EME課程中所需的學科內容知識與學術語言能力，此概念被稱為學科素養 (DL in EME; Dafouz 等人, 2023; 另見 Airey, 2011)。然而，鮮少有研究聚焦在學生自身學科素養的發展 (Dafouz等人, 2023)。本研究主張，以「將經驗視為故事的研究」為定義的敘事探究法 (Clandinin & Connelly, 2006, p. 477) 是理解學生真實經歷的有效途徑。此方法能細緻地深入剖析EME情境中學科素養發展所涉及的複雜歷程，並在無需冗長縱貫資料蒐集的情況下建構出發展軌跡。本研究透過對奧地利EME應屆畢業生進行深度半結構化訪談，建構出四份詳實的 學生敘事。這些敘事指出關鍵的發展因素和階段、各階段特有的挑戰、有效的教學實踐，及課程設計在促進學科素養發展中的重要性。此外，本研究顯示了敘事分析法 (Benson, 2013, 2018; Polkinghorne, 1995) 的潛力，並提出資訊圖表作為呈現學生「EME情境 下學科素養發展軌跡」的有效方法。

Keywords Disciplinary literacies · Narrative inquiry · EMI · English-medium education student perspectives · Infographic narratives

關鍵詞 學科素養 · 敘事探究 · 英語授課 · 學生觀點 · 資訊圖表敘事

Introduction

With the rise of internationalization, the global higher education landscape has changed dramatically over the last 20 years, creating a situation where teaching and learning happen increasingly through English (Macaro, 2018) and where “home but also international students come together” (Dafouz, 2021, p. 23). While this phenomenon is most frequently described as EMI (English-medium instruction), this study prefers the label English-medium education in multilingual university settings (EMEMUS, or short EME), put forward by Dafouz and Smit (2016, 2020), which shifts the focus from instruction in the classroom to a more holistic view of education and explicitly includes student perspectives.

Despite growing research interest, students’ voices remain somewhat under-represented in EME research (Dafouz et al., 2023), especially when it comes to examining their learning trajectories and how they navigate their academic and disciplinary communities over time. Disciplinary literacies in EME (DL in EME), conceptualized by Dafouz et al. (2023), see also Airey (2011, 2020), refer to the development of the relevant language and content knowledge that enables students to navigate their academic programs. This involves developing bi-/pluriliteracies, with often limited institutional language support (Dafouz et al., 2023). While a growing body of research acknowledges the importance of these concerns in EME settings, few studies have so far provided in-depth and student-centered investigations into learners’ reflections on their DL trajectories. This study seeks to address this gap by answering research question 1: How do undergraduate students experience the development of DLs on a business EME program?

Additionally, the study pursues a methodological interest regarding ways of presenting narrative inquiry, as captured in research question 2: How can students' individual DL trajectories be portrayed in a compact and accessible way?

In doing so, the present study explores EME bachelor students' experiences with developing DLs by drawing on narrative inquiry, an underexplored research method in EME that foregrounds students' voices and their lived experiences. It discusses the potential of using narrative inquiry in general, and more specifically, narrative analysis (Polkinghorne, 1995) or narrative writing (Benson, 2013), for investigating DL in EME comprehensively and chronologically without the need for extensive longitudinal research. Additionally, it proposes an innovative multi-modal tool—infographic narratives—for presenting and analyzing students' DL trajectories. This approach allows the identification of key phases and factors in students' DL trajectories over the course of their studies, from their perspective. The paper argues that this approach has great potential to capture the complexity and multi-layered processes involved in DL development, as well as its longitudinal dimension.

The paper begins by discussing DLs in EME as the theoretical foundation of the study, followed by an outline of the methodological basis. This section introduces the narrative inquiry approach and describes the data collection and analysis processes. The next section then gives an overview of the key findings and makes a case for taking a multimodal approach to narrative inquiry by using “infographic narratives.” Following a discussion of key themes identified through the narrative analysis, the paper ends with a conclusion including implications for students, teachers, and future research.

Theoretical Background: Disciplinary Literacies in EME

Tertiary learning has been likened to “the arduous task of decrypting an[d] encrypting an intricate disciplinary code” (Sánchez-Pérez, 2021, p. 2). This task can be conceptualized as Disciplinary Literacy (DL). Different schools of thought have researched how to define, develop, and teach the literacies students need at university, using various labels such as disciplinary literacy (e.g., Airey, 2011), academic literacy (Lea & Street, 2006; Wingate, 2022), and academic discourse (e.g., Hyland, 2009). Nevertheless, the term disciplinary literacy has rapidly gained ground in recent years, shifting the focus from general academic skills to how students use language to build knowledge and navigate specific disciplines (Dalton-Puffer et al., 2024). This interplay between content and language has been highlighted by numerous definitions of DL (see e.g., Airey, 2011; McConachie & Petrosky, 2010; Shanahan & Shanahan, 2012). In particular, DL has been conceptualized in terms of the “ability” that students or aspiring members of an academic community need to

develop “to appropriately participate in the communicative practices of a discipline” (Airey, 2011, p. 3). This includes “the use of reading, reasoning, investigating, speaking and writing required to learn and form complex knowledge appropriate to a particular discipline” (McConachie & Petrosky, 2010, p. 6) while drawing on “a wide range of semiotic resources” (Kuteeva & Airey, 2013, p. 539).

More specifically, Dafouz et al.’s (2023) working definition of DL for EME highlights the importance of considering internationalization and bi/pluriliteracies for DL research in EME settings. In this definition, they sketch DLs for EME as “the set of discipline-specific skills and communication practices that students require to navigate and engage effectively with disciplinary practices in both global and local contexts” (p. 3). In a later paper with different co-authors, Dafouz et al. (2026) propose a framework of three interrelated dimensions to conceptualize DL in and for EMEMUS. The first dimension, *language practices to access the disciplinary community*, focuses on how students develop the discipline-appropriate “linguistic and multimodal expression of thought patterns” (p. 19) that allow them to progressively integrate into academic and disciplinary communities, linking strongly to EAP research and practice (Wingate, 2022). The second dimension, *language practices to develop knowledge structures*, emphasizes the role of language in constructing and conveying discipline-specific knowledge, with research often focusing on oral genres like lectures and discussions and exploring discourse patterns.¹ The third dimension, *language practices to display expertise*, relates to students’ being presented with and expected to produce “targeted expert communicative practices” (Dafouz et al., in press, p. 12), such as texts and talks, which demonstrate mastery of disciplinary practices.² Together, these dimensions highlight that DL development is a highly complex and gradual long-term process.

While understanding how students navigate these intricacies is essential for creating effective learning environments, the inherent complexity and extended timescale of DL development make it difficult to research, with traditional approaches often providing fragmented insights. Much of the existing research that can be related to students’ DL development in EME as operationalized by this study has taken a quantitative approach and has investigated individual factors, particularly variables influencing students’ academic performance. Research on the influence of language proficiency on academic success has yielded mixed results. Curle et al. (2020) found academic success in L1 instruction, but not general English proficiency, to predict academic success in EME, whereas Rose et al. (2020) identified English language and academic English skills as key predictors. Motivation has emerged as a critical factor (Zhou et al., 2024), with studies indicating that students with strong motivation are better equipped to adapt to EME (Kojima, 2021). More recently, the affective dimension in EME has been foregrounded (Lasagabaster et al., 2025), and emotions such as anxiety and confidence have been found to impact learning, with lower anxiety levels improving performance (Hillman et al., 2023).

¹ Research in this dimension has explored, for example, Language Related Episodes (LREs), Cognitive Discourse Functions (CDFs), Exploratory Interactive Explaining (EXINTEX), see Dafouz et al. (in press).

² This dimension has been extensively researched across various traditions, including Systemic Functional Linguistics (SFL), English for Specific Purposes (ESP), and, more recently, Cognitive Discourse Functions (CDFs), see Dafouz et al. (in press).

Other factors investigated include students' language-related challenges, learning strategies and support, the roles of their L1(s), as well as students' status as international or "internationalization at home" (IoH) students, and prior exposure to EME. Galloway and Curle (2022) suggest that international students potentially face additional difficulties as they adapt to the host country's academic culture and expectations, which may impact their academic performance. Technical and academic vocabulary has been found to pose a significant challenge for many EME students (e.g., Pun & Onder-Ozdemir, 2023), as has academic writing (Kamaşak et al., 2021). The use of disciplinary-literacy variables has been positively linked to students' content proficiency (Sánchez-Pérez, 2021), as has the impact of students' strategic L1 use on students' DL development (Pun & Onder-Ozdemir, 2023; Soriano-Flórez, 2026). Prior exposure to EME has been found to facilitate transitions to university-level courses, with students who have such exposure reporting fewer perceived challenges and demonstrating higher vocabulary proficiency (Aizawa & Rose, 2020).

Building on these findings, it is evident that while existing studies shed light on various factors influencing students' DL development in EME, the findings often form a fragmented mosaic shaped by diverse institutional, disciplinary, and contextual influences. The predominant reliance on cross-sectional quantitative methods limits our understanding of the inherently complex, situated, and evolving nature of students' DL development. Given the importance of context in shaping students' trajectories, this paper argues for more comprehensive and nuanced investigations that focus on specific cohorts within defined institutional settings to provide a clearer picture of students' contextualized DL pathways. To address this complexity, it proposes narrative inquiry as a highly suitable approach. As outlined in detail below, narrative inquiry enables researchers to access students' reflective accounts of their experiences and can capture how they perceive and make sense of their DL development over time. In this way, narrative inquiry complements prior research by offering a longitudinal learner-centered lens that foregrounds the subjective and contextual dimensions of DL development often missing in quantitative studies.

Study Design

The Narrative Inquiry Approach

The present study adopts a narrative inquiry approach for analyzing students' lived experiences with developing DLs in EME, which allows for rich, nuanced insights into students' DL trajectories from their perspectives. More specifically, the study draws on narrative analysis (Polkinghorne, 1995), or narrative writing (Benson, 2013), a form of narrative inquiry that makes use of storytelling for data analysis and presentation (Benson, 2018).³ It further presents "infographic narratives" as an innovative, multimodal tool for presenting students' narratives.

³ Narrative analysis is one of the two main approaches taken in applied linguistics narrative research. The other main approach is analysis of narratives, which takes stories as data for content or discourse analysis. For an overview, see e.g., Barkhuizen (2022), Barkhuizen et al. (2025), and Benson (2018).

Narrative inquiry has been used by sociologists and anthropologists for decades (Barkhuizen, 2022) and has gained prominence in applied linguistics research since the 2000s, in particular in language teaching and learning research (see Ghanbar et al., 2024 for a systematic overview), where it has been used to examine the experiences of teachers and learners, such as their learning processes, identities, emotions, relationships, and imagined futures (Barkhuizen, 2022). However, so far, very few studies have taken an explicitly narrative research approach to EME research, and those that have done so have predominantly focused on lecturers (e.g., Kral, 2022; Toh, 2016). Two notable exceptions are Flowerdew and Miller's (2013) study on mainland Chinese students' experiences with studying on an EMP in Hong Kong and, more recently, Şahan and Sahan's (2023) exploration of emotions in EME, using stories as research data and analyzing four graduate students' stories of their EME experiences. However, to the best of this author's knowledge, no scholars have so far used narrative inquiry to investigate DL in EME.

There are several aspects that make narrative inquiry in general, and narrative analysis in particular, especially valuable for investigating DL in EME from a learner's perspective. First, defined as "the study of experience as story" (Clandinin & Connelly, 2006, p. 477), narrative inquiry foregrounds participants' voices by constructing and presenting stories of their unique lived (and imagined) experiences (Barkhuizen et al., 2025). In other words, it aims to understand participants' "meaning making, their understanding, of their experiences, from their perspective" (Barkhuizen, 2022, p. 3), as well as the interconnectedness and specifics of individuals' situations and trajectories. Second, narrative inquiry can complement more traditional qualitative research approaches by exploring participants' experiences comprehensively and chronologically (Benson, 2014; Nasheeda et al., 2019). Having the whole story of a student's experiences rather than focusing on isolated points in time makes it easier to research inherently longitudinal processes such as DL development.

Furthermore, narrative inquiry is particularly well-suited for capturing development without requiring the extensive resources typically associated with large-scale longitudinal studies, which demand substantial time and effort from both participants. Although some short-term longitudinal studies (e.g., Aizawa, 2024) have tracked language development over a semester, there remains a need for research that spans entire academic programs. Narrative analysis offers an alternative possibility: by construing participants' retrospective reflections into chronological research narratives, it allows researchers to gain insights into how students make sense of their own study trajectories and to identify key phases and influencing factors in students' DL development. While it cannot replace longitudinal designs, it can alleviate some of their challenges and still offer meaningful, temporally grounded insights into students' longer-term experiences (Clandinin & Connelly, 2000). In short, narrative inquiry has great potential for researching students' DL in EME trajectories.

Data Site

As EME programs are highly context-specific, this study focuses on a single case—a cohort at an Austrian University of Applied Sciences (UAS)—which allows for an in-depth exploration of students' lived experiences in this particular institutional context. UAS typically show a strong vocational orientation, complementing traditional research universities. In Austria, they cater to about 16% of the student population and are internationally strong, but also regionally oriented (Smit & Grau, 2024). The program in which the study is set is a 3-year business bachelor's program in a mid-sized town in Austria. The program is conducted entirely in English and has a strong international orientation, reflected in both its student body and curriculum design. The UAS program actively seeks to attract both Austrian students and those from other European countries, participating in education fairs beyond Austria's borders to reach a broader audience. The success of such measures is reflected in the study cohort that formed the basis for this study, which comprised 78 students in total, of whom 46 were of Austrian nationality and 32 were students from 13 different nationalities. A high proportion of these students came from the neighboring Eastern European countries of Hungary and Slovakia (14), as well as from other European countries. This resulted in a highly diverse student body, with different L1s, prior education experience, and English proficiency levels. In addition, the program's curriculum allows students to spend up to 1 year of their 3-year bachelor's program abroad, offering an (optional) exchange semester in the third semester and a mandatory internship abroad in the fourth.

While the curriculum is internationally oriented, it does not include explicit EAP/ESP support by language professionals, a common issue in EME programs in Austria and beyond (Lasagabaster, 2022; Smit & Grau, 2024). Nevertheless, the EMP's structure does provide scaffolding for writing academic research proposals and papers. All students attended research methodology classes held by the same content lecturer during their first and second semesters, where they were given detailed instructions on how to write academic research proposals and papers, and submitted their first academic texts, which also helped control the effects of different teaching approaches on students' DL trajectories for this influential first experience with writing academic texts. After their exchange and/or internship semester(s) in year 2, students then had to hand in their bachelor's proposal and bachelor's paper in semesters 5 and 6, respectively, guided by bachelor seminar classes and their thesis supervisors. An overview of this structure is given in Fig. 1. Moreover, due to the COVID-19 pandemic, participants' study paths were shaped by episodes of emergency remote teaching (ERT, Hodges et al., 2020), which is also indicated in Fig. 1.

Data Collection and Participants

Data for this study was collected as part of an ongoing research project, involving 18 in-depth interviews with students from the same cohort of the EME program described above. The interview participants were recruited through collaboration with the research methodology lecturer, who permitted presenting the project and

Structure of the EMP

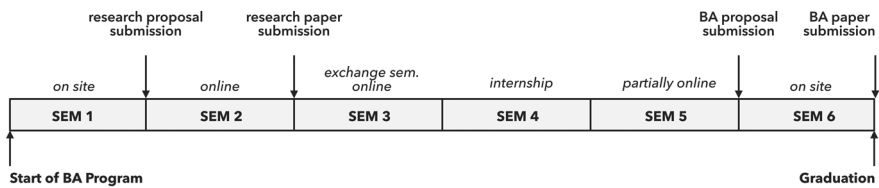


Fig. 1 Structure of the EMP. (All figures presented in this study, including the infographic narratives, were designed with Affinity Publisher)

Table 1 Overview of complete data set

Type of data	Participants/context	Total amount
18 in-depth semi-structured interviews 4 of these selected as key students	Students	24 h 16 min
5 in-depth semi-structured interviews	Lecturers	7 h 31 min
18 sets of - 1st year research proposals - 2nd year research papers - 3rd year bachelor proposals - 4th year bachelor papers	Student texts (one set per student)	591,138 words
Class observation for informative purposes - 1st semester research methodology class - 5th semester bachelor seminar	Research methodology lecturer + bachelor students	2 × 90 min

inviting participants in her fifth-semester bachelor seminar class, and through snow-ball sampling (Duff, 2008). Additionally, because the context, or space (Benson, 2021), of participants' experiences is important for any narrative inquiry, as much additional data as possible was collected to provide a thick description of the EME-MUS context and inform the narrative analysis. An overview of the complete data set can be found in Table 1. This study focuses on the student interviews, as they provide in-depth insights into participants' lived experiences, while the analysis of students' texts will be undertaken in subsequent work to enable further triangulation of findings.

The four "key" students chosen for the narrative analysis were identified through purposeful random sampling (Duff, 2008) using the criteria of language background, prior knowledge of German, EME experience, and gender. These criteria were chosen to ensure the inclusion of information-rich cases that reflect the diversity present in the student cohort that the UAS needs to cater to. Specifically, the selection aimed to include students with and without prior EME experience, both male and female, internationalization-at-home (IoH) and international students, and international students with and without prior knowledge of German. An overview of the participants is provided in Table 2, with the students selected for the narrative analysis highlighted in grey. The interviews were held during the students' sixth and last semester, shortly before the bachelor's thesis submission deadline and final exams. All interviews were held on the basis of informed consent, audio- and video-recorded,

Table 2 Overview of interview participants with key participants indicated in grey

Name	Gender	Nationality	L1(s)	Educational background and previous EME experience	Length
Paula	Female	Austria	German	Higher vocational school in Austria (German)	1 h 23 min
Andrea	Female	Austria	German	Higher vocational school in Austria (German)	1 h 25 min
Bettina	Female	Austria	German	General high school in Austria (German)	1 h 14 min
Indira	Female	Austria	German	Higher vocational school in Austria (German)	1 h 10 min
Benjamin	Male	Austria	German	Higher vocational school in Austria (German)	1 h 15 min
Lukas	Male	Austria	German	Higher vocational school in Austria (German)	1 h 10 min
Teresa	Female	Austria	German	Higher vocational school in Austria (German)	1 h 01 min
Vanessa	Female	Austria	German	Higher vocational school in Austria (German)	1 h 14 min
Simon	Male	Germany	German	General high school in Germany (German) + high school exchange semester in Montreal Canada (English-French)	1 h 06 min
Laura	Female	Austria + Germany	German	General high school in Austria (German) + high school exchange in Texas and England	1 h 50 min
Alena	Female	Slovakia	Slovak	Bilingual high school in Slovakia (English-Slovak) with business specialization	1 h 19 min
Adam	Male	Slovakia	Slovak	General high school in Slovakia (Slovak)	1 h 10 min
Balázs	Male	Hungary	Hungarian	Bilingual high school in Hungary (English-Hungarian) with business specialization + high school exchange semester in England	1 h 13 min
Galina	Female	Moldova	Rumanian	General high school in Romania (Romanian)	1 h 12 min
Nina	Female	Slovakia	Slovak	General high school in Slovakia (Slovak)	1 h 25 min
Filip	Male	Slovakia	Slovak	Bilingual high school in Slovakia (German-Slovak) with business specialization	1 h 36 min
Arian	Male	Hungary/Iran	Hungarian/Farsi	International high schools in Hungary (English) and Teheran (German)	1 h 43 min
Larissza	Female	Hungary	Hungarian/German	General high school in Austria (German)	1 h 50 min

All names are pseudonyms chosen on the basis of popular names of the students' country of origin

and subsequently transcribed for further analysis. Before each interview, participants were given a consent form detailing the study and procedures. Interviews lasted between 1 and 1 h 50 min (1 h 20 min on average).

To explore DL development in a comprehensive manner, the interviews explored interrelated aspects of this study's DL conceptualization, such as students' reflections on their general EME experiences, their perceived English language development, the roles of their L1(s), English, and other languages for developing DL, and their experiences with writing academic texts. The interview guide was thematically structured around these aspects, and questions and prompts were designed to encourage open-ended reflections. While not structured chronologically, several of the questions already included a time reference (e.g., "What was most challenging at the beginning of your studies? How does writing the BA proposal compare to writing the BA paper?"). At other times, students linked their reflections to specific events/times during their BA studies or recounted a change in their experiences without being prompted.

Data Analysis: Narrative Analysis

This study employs a form of narrative inquiry sometimes referred to as narrative analysis (Polkinghorne, 1995), or narrative writing (Benson, 2013, 2018), as a tool for analyzing data and presenting findings. Narrative analysis is a process which constructs coherent research narratives of participants' experiences from (typically) non-narrative data (Benson, 2014). The resulting narratives provide rich insights into participants' lived (or imagined) experiences (Barkhuizen, 2022) and highlight the relationships between data elements. By doing so, they reveal the "uniqueness of the individual case or bounded system and [provide] an understanding of its idiosyncrasy and particular complexity" (Polkinghorne, 1995, p. 15).

As many narrative researchers have argued, narrative inquiry involves more than storytelling; it means carrying out structured and thorough processes of making sense of non-storied and non-chronological data through the lens of a specific research interest (e.g., Barkhuizen et al., 2025). However, a common critique of narrative analysis is a lack of transparency in how exactly the non-narrative data is transformed into narrative form (Consoli, 2021). In order to mitigate this criticism, this process is now described in detail.

The data analysis followed a structured, multi-step process inspired by Benson (2013). First, I read the interview transcripts and interview notes for each participant multiple times to "work myself into [the student's] way of thinking" (p. 258). Data irrelevant to the research focus was excluded. Excerpts were considered for inclusion into the written narrative if they (a) related to the (broad) DL conceptualization of this study and (b) covered students' reflections related to their own DL experiences⁴ and (c) indicated some form of development or change. As a next step, related excerpts were grouped into thematic clusters, which were then organized sequentially into a "beginning-middle-end of studies" structure. Subsequently,

⁴ Lengthy elaborations on students' observations of their colleagues' experiences were not included.

the extracts were composed as coherent paragraphs, which included integrating my own voice into the narratives while aiming to keep true to the participants' personalities and preserving their original voices as much as possible, paying attention to Barkhuizen et al.'s advice to not let the "researcher's words [...] overwrite those of the participant" (2024, p. 121). Once a first draft of the narratives was completed, I let them sit for a while and then went back with fresh eyes. As a next step, I conducted a thematic analysis across the four narratives, with which I identified key factors and phases in students' DL development, as evident in their stories. By focusing on these, it was possible to develop a narrative structure "template" that offered a coherent and comparable structure and was then used to revise the narratives. Although this has not been reported in previous studies, this paper proposes that it is highly useful to ensure a consistent structure across all narratives centered on the study's central research question. Finally, the written narratives were revised once more to ensure they provided a clear and cohesive representation of students' reflections on their DL development over their 3-year bachelor's studies. These finalized narratives, comprising around 2000 words each, represent the first outcome of the analysis.

Presenting these narratives in research outlets such as publications or presentations proved challenging due to their extensive length and the level of detail required to illustrate the value of a narrative analysis over conventional content or thematic analyses. To resolve this challenge, I developed a tool—termed infographic narratives—designed to visually and concisely represent students' study trajectories while highlighting the key developmental factors and phases identified through the narrative structure. The outcome of these processes will be presented in the next section.

Findings

The Narrative Template and Finalized Narratives

The narrative structure template developed through a thematic analysis of the draft narratives proved to be invaluable for ensuring a consistent structure across all narratives, which focused on the study's central research question and helped reduce researcher bias. It highlighted key developmental factors and phases in the students' DL trajectories and later also formed the basis for the infographic narratives focusing on these aspects. The narrative template used for constructing the final narratives, following the process outlined in detail above, can be found in Fig. 2 below.

To illustrate how this template was operationalized to create the finalized narratives, a slightly abridged version of Filip's narrative is presented below. For reasons of space, it is impossible to include all four written narratives, although the remaining narratives will be presented in the next sub-section as infographic narratives. Filip's narrative has been chosen as the example, as it very clearly illustrates the trajectory of his DL development. However, this should not be understood as it being more interesting/valuable than any of the others.

BACKGROUND INFORMATION	Student's basic demographic information (incl. age, L1s and Lx, educational background) and their experiences with EME and exposure to English prior to entering university
STARTING THE EMP	Student's level of confidence with studying in English upon starting university, their expectations about studying in English, their reasons for choosing an EME program and for choosing the EMP at hand
INITIAL EXPERIENCES	Student's experiences and challenges with transitioning to EME at tertiary level
FIRST-YEAR EXPERIENCES WITH ACADEMIC WRITING	Student's experiences with writing their 1st semester research proposal and 2nd semester research paper and the strategies they employed for writing these academic texts
L1 USE & ROLE OF LANGUAGES	Student's exposure to English outside of class. Students' use of English and their L1(s) in the context of their EME studies.
ONLINE CLASSES	Student's experiences with emergency remote teaching during the pandemic lockdowns.
EXCHANGE SEMESTER/ INTERNSHIP EXPERIENCES	Student's reflections on where they spent their second year (exchange/ internship semesters) and how it impacted their EME trajectories
THIRD-YEAR EXPERIENCES WITH ACADEMIC WRITING	Student's experiences with writing their 5th semester bachelor's proposal and 6th semester bachelor's paper and the strategies they employed for writing these academic texts
ENGLISH LANGUAGE DEVELOPMENT	Student's reflections on their (English) language development over the course of their three-year study program
CONCLUDING REFLECTIONS & FUTURE PLANS	Student's overall reflections on studying in English and their future work- and study-related plans.

Fig. 2 The narrative template

Filip: Abbreviated Narrative

At the time of the interview, Filip was a 22-year-old student from Slovakia, in the final year of his bachelor's program in business at an Austrian University of Applied Sciences (UAS). He grew up speaking Slovak at home and was already proficient in both English and German before starting university. Filip began learning English in kindergarten and attended a bilingual academy of commerce in Slovakia at the upper secondary level, with classes being held in Slovak and foreign language classes in German and English. He had not lived abroad before moving to Austria to study in English. Filip's choice to enroll in the business EME program was largely coincidental; his initial plan to study Chinese in the Czech Republic was unsuccessful. Encouraged by a friend, he applied to UAS just in time, picking the business program due to its later application deadline. He anticipated that studying in English would boost his language confidence and career prospects to "elevate the level of my whole life, pushing me even further."

For Filip, a key challenge upon entering university was mastering "higher-level" vocabulary for writing research papers, including scientific terms—to "push" texts "to the higher level" and make them "sound fancy and also good." He found finance,

accounting, and research methodology especially difficult. In finance and accounting, he struggled to “connect” terms with their equivalents in his native language, while in research methodology, the lecturer’s use of “terminology and high-end expressions” proved challenging. Although he thought simpler language might have eased understanding, he acknowledged that advanced vocabulary is “a natural part of studying in English” that students must tackle independently.

Throughout his first year, Filip frequently relied on translation tools for unfamiliar vocabulary and academic synonyms, especially for exams and research writing, and he expressed gratitude for the internet’s assistance. Writing his first research proposal was challenging, as he was unfamiliar with how to find proper sources and how to incorporate them effectively. Accents from some lecturers initially posed comprehension issues, but with time, he adjusted and became more comfortable understanding and using English, also with friends and in daily activities.

For his third semester, he had opted not to do an exchange semester because he was afraid that going to a different place would “take me a lot of time just to get used to the city and used to the culture.” Due to the pandemic, he spent his third semester participating in online classes from home in Slovakia. The shift to online classes during the pandemic added distractions; Filip admitted to multitasking at home, as “you don’t have your camera on,” with little engagement being a struggle in class. In his fourth semester, he did his obligatory internship working for a global insurance company in Bratislava, where he was mainly in contact with English (through software and client contact) and German. While he did not feel that it affected his English journey much, he was very grateful to the UAS for giving him this opportunity for an internship semester because it “opened me doors for the future.”

By his fifth semester, Filip’s understanding of academic expectations had grown, which allowed him to use fewer translation aids. He was also more comfortable with following the lecturers in class. Writing his bachelor’s proposal felt easier and quicker than writing the research proposal in the first semester because now Filip understood “how things work and how I should go about it.” He set about finding a topic and scientific articles, paraphrasing extracts, and adding citations to avoid plagiarism, which was something he knew he needed to pay extra attention to. He relied heavily on his lecturer’s feedback and was grateful for her detailed comments on both language and content. Despite finding it challenging to see his draft “more red than black,” he appreciated the value of the detailed, specific suggestions, which helped him revise his text. Writing his bachelor’s thesis in his sixth semester brought some new challenges, as he struggled with citations and sourcing, and with higher expectations of the lecturers because of the thesis being “the final thing” for graduation.

Overall, what helped him most in his disciplinary writing was his lecturers showing him “how to use the terminology and what words we should use” to avoid “something [that] is very spoken.” For both his BA proposal and BA paper, he found it helpful that his lecturers provided him with “higher-end options for the basic expressions,” mostly for citations and the conclusion, which helped him understand

how to select and use suitable expressions. He still used Google for synonyms and appreciated his coach's language corrections, which, though challenging, improved his writing significantly. This process also helped him adopt these expressions more naturally, which he believed will benefit him professionally. Comparing his work to a friend's overly informal paper made him grateful for his lecturer's high standards.

Reflecting on his growth, Filip felt he now expressed himself with greater ease and precision, noting, "I don't need to search for the words anymore." He was grateful for the program's combination of work experience and international exposure, feeling confident as he approached his master's studies in digital business innovation.

Infographic Narratives

As illustrated by Filip's narrative above, narrative analysis is a valuable tool for capturing the complexity of students' EME experiences. However, as narrative scholars have noted, the depth of these narratives is difficult to convey in academic publications due to constraints such as character limits imposed by journal guidelines (Bell, 2011). Such restrictions can prevent researchers from fully doing "justice to the richness and complexities of the reported narratives" (Consoli, 2021, p. 2). Reporting these findings in conference presentations poses an even greater challenge.

Nevertheless, the unusual step of constructing a narrative analysis "template" such as the one presented in Fig. 2 creates a foundation for an even more innovative approach to presenting the outcomes of a narrative analysis.⁵ This paper proposes a multimodal representational tool, referred to as "infographic narratives," to summarize and visually present the narratives while drawing attention to key factors and phases of students' DL development (as identified through the thematic analysis, see Fig. 2). At the same time, this format still allows researchers to preserve the full trajectory of each student. Figure 3 below presents Filip's narrative, which was given in written form above, as an infographic narrative.

As illustrated in the written narrative and Fig. 3 above, the infographic narrative is a visually appealing mode for presenting key findings of the narrative analysis that is practical for both publications and conference presentations. While some detail may be lost, it offers an effective way of summarizing the key points without sacrificing nuance and draws the audience's attention to the students' chronological learning trajectory as well as Filip's own comments.

While Filip's narrative provides insights into the experiences of an international student with prior knowledge of German, the other three narratives present a range of other perspectives. Together, the narratives represent four broad types that the UAS has represented in their student body. Like Filip, Alena (Fig. 4) is an

⁵ Previous narrative inquiry research has used visual and multimodal texts to elicit participants' stories, as narrative data in their own right, or embedded within written narratives (see Barkhuizen et al., 2025 for an overview). However, to the best of the authors' knowledge, no study has so far used infographic narratives for analyzing and presenting the outcomes of narrative analysis.

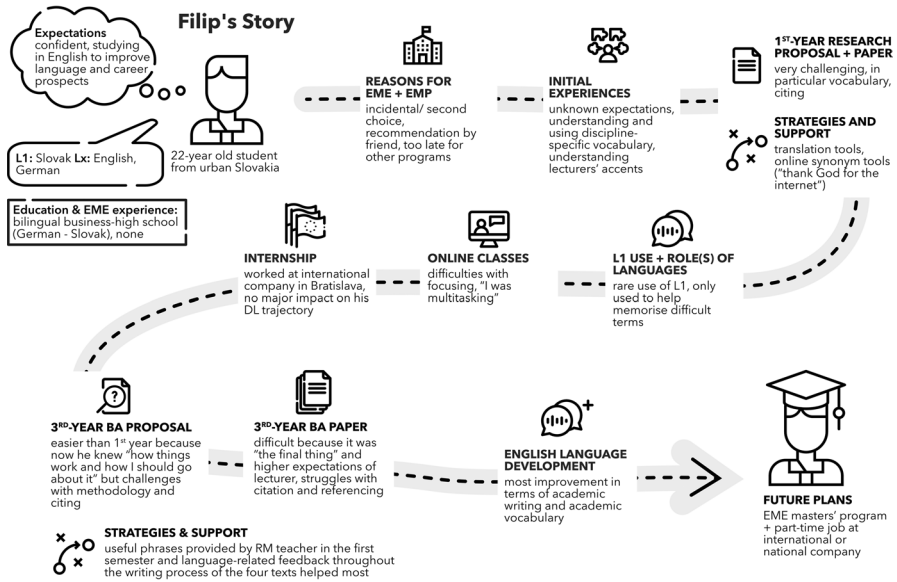


Fig. 3 Infographic narrative 1—Filip's DL development

international student from a neighboring country, but, unlike Filip, she has no prior knowledge of German. She does, however, have prior EME experience. In contrast, Paula (Fig. 5) and Simon (Fig. 6) are both students with German as their L1. However, while Simon has prior EME experience abroad and a high level of exposure to

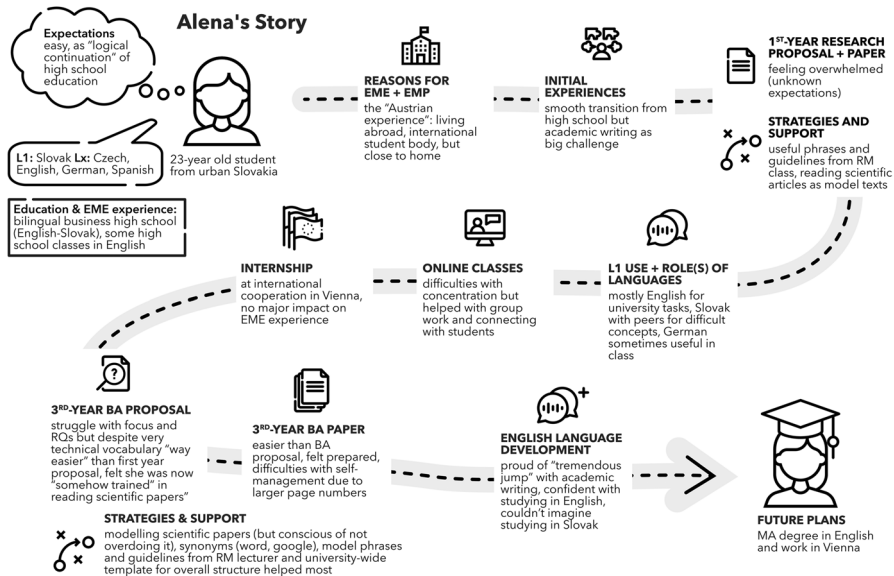


Fig. 4 Infographic narrative 2—Alena's DL development

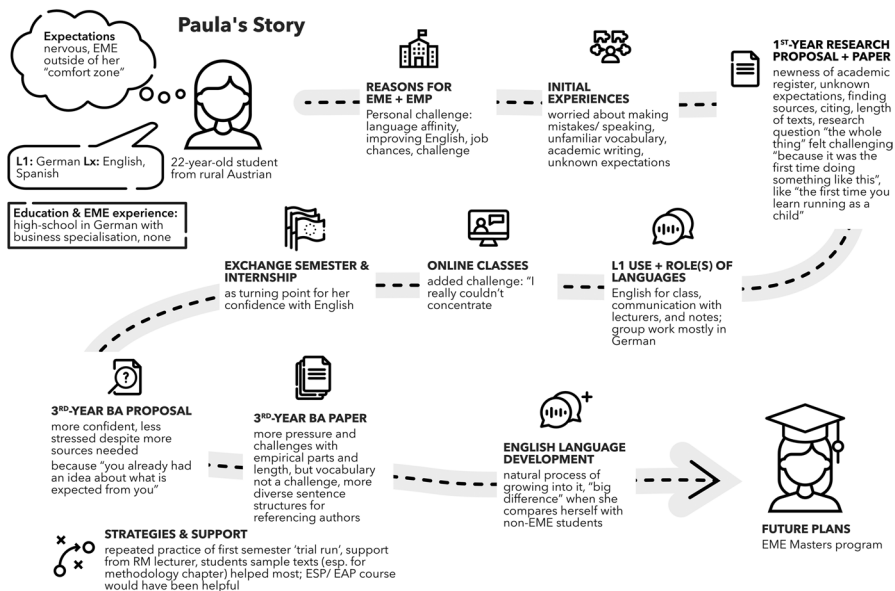


Fig. 5 Infographic narrative 3—Paula's DL development

English outside the classroom, Paula's narrative offers insights into the experiences of an Austrian student from a more rural area struggling with low (self-reported) proficiency and low confidence initially. Each of the infographic narratives (Figs. 3, 4, 5, and 6) visualizes one of these four DL journeys.

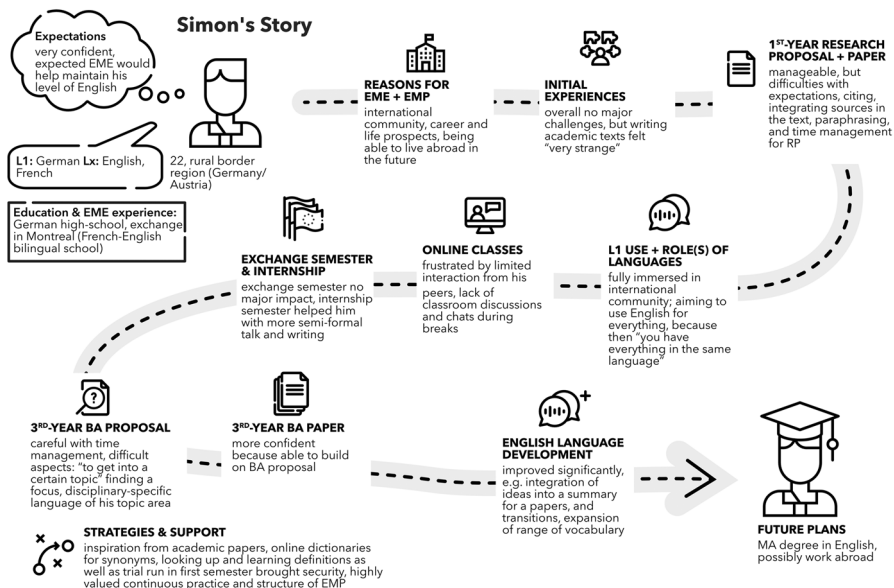


Fig. 6 Infographic narrative 4—Simon's DL development

Each narrative offers unique insights into the students' DL journeys, shaped by their diverse educational, national, and linguistic backgrounds, and reflects the varied profiles of students served by the UAS. Although the infographic narratives inevitably present a reduced version of the full narratives, and some loss of complexity is an inherent drawback, they offer a valuable way to make the rich, developmental insights gained through narrative analysis more accessible and engaging to a broader audience. Their visual structure supports clear comparisons and contrasts between the student trajectories, helping identify patterns and differences across the cases. These patterns and differences are discussed in the next section.

Discussion

This section discusses key findings related to undergraduate EME students' DL development, highlighting the interwovenness of factors made visible by the narrative analysis. It is structured around themes that emerged as particularly significant from the narrative analysis, which resulted in both the detailed text narratives and the simplified infographic narratives presented above. First, it examines how EME outside the UAS has impacted the students' DL development. Next, it highlights how students topicalize DLs with a particular focus on academic writing as a widely shared challenge. Finally, it looks at what strategies students and teachers use to assist the development of the students' DLs.

EME Experience Outside UAS

Experience with EME outside UAS, whether in the form of prior EME or as an exchange semester as part of their UAS degree, was widely reported to play a role in developing disciplinary language and literacy, though to varying extents. Reflecting the findings of previous studies (Aizawa & Rose, 2020), the students who had prior EME experience seemed to have navigated challenges with relative ease, especially at the beginning of the program. Simon, in particular, had strong intrinsic motivation and sought out opportunities to expose himself to English before coming to UAS. Both Simon and Alena recalled a relatively "smooth transition" from high school and generally felt comfortable with what was expected of them. In contrast, Filip and Paula struggled more overall, with both highlighting "unknown expectations" as a key challenge.

Once at the UAS, Simon's strong international orientation led him to use as much English as possible both on and off campus. This high level of exposure to English meant that his exchange semester had no major impact on his DL experiences, whereas Paula's exchange semester represented a decisive "turning point" in her EME trajectory. Nevertheless, both Simon and Paula reported that going abroad helped them become more confident with semi-formal talk and conversation, something they found lacking in comparison to their disciplinary and academic language

proficiency. General vocabulary was perceived by some as more difficult than the academic vocabulary they were used to.

In addition to prior EME exposure, prior exposure to technical vocabulary/technical subjects in the students' L1 or other languages also helped overcome challenges. For example, Paula's prior knowledge of accounting (even though in German) helped ease her EMI transition for this subject, which has also been observed by previous studies on first-semester experiences of students (Aizawa, 2024).

Topicalizing DLs and Acculturation into the Discipline

While more challenging for some than others, the detailed text narratives revealed that, to some degree, familiarizing themselves with unfamiliar academic conventions or disciplinary language and practices was a step to overcome for all students. Filip and Paula, who initially found it more difficult to adjust to EME, reported struggling with adjusting to academic and disciplinary-specific vocabulary. The program's partial online delivery in the form of ERT episodes during the COVID-19 pandemic was described by all students as challenging; however, they noted that these challenges were largely unrelated to language use and instead concerned maintaining concentration and avoiding multitasking. Furthermore, all students reported that the process of designing research projects and engaging in academic writing was a key challenge of their studies.

Nevertheless, while previous research has noted more severe struggles, finding that "adjustment to EMI can be a persistent struggle that spans the entire course, and not just initial challenges to overcome" (Aizawa, 2024, p. 28), the students in the present study all had the same joint feeling of having grown into EME and, at the end of their studies, felt very confident about studying in English. Alena even stated that she could not imagine studying in Slovak, and both Filip and Paula felt proud of their English language development compared to peers who had not studied in English, with Paula commenting, "I mean, you shouldn't compare yourself at all, but I mean, sometimes you still do. And then you just see how much you benefited from studying in English, I guess." This demonstrates the value of the structured chronological narrative, which puts a spotlight on longitudinal progression and makes it possible to capture the students' entire study trajectory.

Academic Writing as a Challenge for Everyone

Regardless of how challenging students perceived their EME studies to be, all four students found writing academic texts to be the (or one of the) most challenging aspects of their studies, especially at the beginning of their degree, which aligns with previous research (Kamaşak et al., 2021). This is highlighted by Simon reflecting that, despite everything else being easy, academic writing felt "very strange" and posed its difficulties. Students also felt a general feeling

of being overwhelmed by not knowing what to expect and how to go about writing a research proposal/paper and using academic register, but also citing and integrating sources into the text. Alena remembers with writing academic texts in the first semester “everything was new and you had no idea how to do that. It’s like when you first learn running as a child.”

The narratives highlight the progressive writing tasks—the research proposal and paper in the first year, followed by the bachelor’s proposal and thesis in the third year (see Fig. 1)—as key milestones in students’ individual trajectories. For instance, Alena’s progression from feeling “overwhelmed” with the first-year research paper to “prepared” by the third year illustrates this development, with her reflecting that “definitely from the writing perspective, there was a tremendous jump.” Similarly, Filip found the fifth-semester bachelor’s proposal “much easier because [he] knew how things worked,” with Paula and Simon reiterating his sentiments. Simon also felt more confident approaching the bachelor’s thesis after writing the bachelor’s proposal. These insights underscore the longitudinal nature of students’ DL trajectories, as supported by the program’s structure, and show how prior experiences contribute to students’ growth and confidence over time, which is made visible by the narratives. This is precisely where the strength of narrative inquiry lies: it enables a more layered and temporally grounded understanding of DL development, revealing turning points and evolving self-perceptions that are often flattened or overlooked in more traditional approaches.

Teacher and Student Solutions: Strategies and Scaffolding

As seen above, all students highly valued the program’s structure with the two research proposals, which can be seen as an example of best practice for developing DLs in EME. While the responsibility for developing DLs is often laid on individual teachers’ shoulders, this demonstrates how the overall curriculum design can be of great support to students in EME programs.

Furthermore, students also reported many strategies that helped them overcome the challenges they had identified. For their own part, they relied on translation and online synonym tools (“thank God for the internet”; Filip) and reading academic papers as models for “inspiration” (Simon) and language. All students highlighted the usefulness of their first-year⁶ research methodology lecturer’s language-related support. She provided useful phrases for academic writing, model texts and guidelines, and gave extensive and detailed feedback on both content and language-related aspects in assignments, adding comments like “check for grammar,” “level of expression,” which was highly appreciated by all four students, despite the texts sometimes being “more red than black” (Filip).

This shows that despite the support provided through the curriculum structure, this more in-depth language support hinges, once more, on the language interest of

⁶ Some students had the same teacher also as lecturer in their bachelor seminar in the fifth semester (Alena, Paula) and/or as supervisor for their BA thesis (Paula, Filip).

one dedicated content teacher. As part of the larger research project of this study, four other bachelor seminar lecturers/thesis coaches were interviewed, and all of them saw language much less as their responsibility and reported not providing much language-related feedback.

Conclusions and Implications

The present study proposes an innovative approach to exploring and presenting students' disciplinary literacy (DL) trajectories in English-medium education, which provides in-depth insights into students' perspectives and contextualized experiences, and thus will hopefully help researchers and policymakers alike to grasp the complexity of DL in EME. In short, narratives help reveal the complexities and chronology of an individual's experiences that are often overlooked by other research methods (Barkhuizen et al., 2025). The chronological and longitudinal structure of the narratives allows for tracing patterns of developmental progression and highlights the variety of factors influencing students' DL trajectories to varying degrees. Furthermore, by developing a structured written research narrative and highlighting key factors and phases in a condensed infographic narrative, it is not only simple and attractive to present but also makes patterns and differences across the data set visible while still keeping the participants' full trajectories intact. In this case, it drew attention to (1) the impact of prior EME as a factor in confidence and competence at the start of the course and (2) the acculturation into the discipline over time. Furthermore, it (3) highlighted writing academic texts as an area that was found particularly challenging by all the students, even those who had had previous EME exposure, and (4) showed strategies and scaffolding that can guide student DL development.

While this study offers valuable insights, it is important to acknowledge that the data are retrospective in nature, based on students' self-reported reflections. As such, their accounts are inherently shaped by their current perspectives and may be subject to selective recall or reinterpretation of past experiences. A longitudinal design with data collected at multiple points during the program would have made it possible to trace how students' perspectives evolved over time and to gain more immediate insights at different stages. To address this limitation, future research within this larger research project will analyze students' first- and third-year written output to provide a more comprehensive perspective. Furthermore, as with all qualitative research, generalizability of the findings is limited, as the data were collected from a single Austrian university. Comparative studies examining students' DL trajectories in other university contexts are an avenue for further research.

Nevertheless, this study provides implications and tools for researching DL in EME on several levels. To start with, by taking a narrative inquiry approach and investigating last-semester students' reflections on their DL trajectories, it suggests a way to do justice to the long-term nature of students' DL development and gain rich insights into students' experiences without the need for multi-year data collection, which often is not feasible, especially for smaller research projects. The study argues that narrative analysis presents a viable alternative by drawing on reflective accounts while still

respecting the importance of chronology. These research narratives provide contextualized insights into students' DL trajectories over time, highlighting key factors and phases in students' DL development, students' challenges with academic writing, effective teaching practices, and the importance of curricular DL support.

Furthermore, the present paper contributes to the communication of the findings from a narrative analysis, addressing one of the major challenges facing narrative scholars, namely, the problem of how to present a painstakingly constructed narrative analysis within the constraints of a journal paper or conference presentation guidelines. To overcome this problem, firstly, a narrative structure template was developed, based on the students' key developmental factors and phases that emerged from the narrative analysis. This provided a structure for the written narratives and was then developed into infographic narratives, which are proposed here as a new tool for analyzing and presenting research narratives, i.e., the outcomes of a narrative analysis.

The benefits of using a multimodal infographic narrative are twofold. Firstly, it is a compact, concise, and highly attractive way to present key findings from a narrative analysis without compromising chronology. While some complexity is inherently lost in comparison to the full written narratives, the infographics allow for keeping the individual stories/trajectories intact and highlight important themes in students' accounts related to their DL development as identified through the narrative analysis. Secondly, once a narrative structure has been developed on the basis of representative individuals, the format of the infographic narrative can be used as a narrative frame⁷ to collect further storied data, for needs analyses and curriculum development, or as a reflective tool for students to be made aware of their progress in EME (see, as an example, the template in the Appendix). Adaptable to individual institutions and research foci, these multimodal infographic narratives can further make research results more accessible to diverse audiences, including practitioners, thereby enhancing their impact.

Finally, the narratives highlight both key factors and phases, as well as examples of best practice that can guide the development of more effective EME programs. One key implication is the need to provide curricular support that allows students repeated opportunities to practice and refine their skills throughout their academic journey. Additionally, they foreground the need to integrate content and language support, particularly for academic writing, into the curriculum, rather than relying on the commitment of individual content lecturers. Finally, this analysis shows it is essential to consider the varied experiences of the students at a specific institution when designing English-medium education (EME) programs for those students, ensuring that these programs address diverse student trajectories and needs. Likewise, narrative analysis presents a means to identify such trajectories and needs.

All in all, this paper demonstrates the value of narrative inquiry for investigating DL development in EME and presents an innovative way to present the results. At the same time, as so many have done before (e.g., Dafouz et al., 2023; Lasagabaster, 2022), it highlights the need for collaboration between content and language teachers and the true and institutionalized integration of content and language in EME.

⁷ For research on the use of narrative frames for data collection, see G. Barkhuizen (2014).

Appendix

BEFORE STARTING UNIVERSITY, I EXPECTED STUDYING IN ENGLISH TO BE

Name _____

MY FIRST LANGUAGE(S) IS/ ARE _____

I ALSO SPEAK AND/ OR UNDERSTAND THE FOLLOWING LANGUAGES _____

I AM _____ YEARS OLD AND I COME FROM _____ (COUNTRY).

I GREW UP IN A _____ (BIG CITY, SMALL TOWN, RURAL AREA)

I WANTED TO STUDY IN ENGLISH BECAUSE _____

IN MY FIRST SEMESTER, IT WAS REALLY DIFFICULT FOR ME TO _____

THIS WAS MADE EASIER BY _____

BUT I WOULD HAVE NEEDED MORE SUPPORT FOR _____

I HAVE ALREADY STUDIED IN ENGLISH DURING _____

DURING MY STUDIES I WAS ABLE TO SPEND A SEMESTER ABROAD IN _____

THIS HAD AN INFLUENCE ON MY EME STUDIES BECAUSE _____

DURING MY STUDIES, I USED MY FIRST LANGUAGE FOR STUDYING IN ENGLISH IN THE FOLLOWING WAYS (E.G. ASKING QUESTIONS IN CLASS, GROUP WORK, TAKING NOTES, PREPARING FOR EXAMS) _____

IN MY THIRD YEAR, IT WAS STILL REALLY DIFFICULT FOR ME TO _____

IT HAD BECOME EASIER TO _____

AFTER STUDYING IN ENGLISH FOR THREE YEARS, I NOTICE NOW THAT IT IS MUCH EASIER TO _____

I BELIEVE, WHAT HAS HELPED ME MOST IS _____

BUT I WOULD HAVE NEEDED MORE SUPPORT FOR _____

IT WOULD HAVE BEEN GREAT TO RECEIVE MORE SUPPORT WITH _____

AFTER GRADUATING, I WANT TO STUDY/ WORK IN (FIELD, COUNTRY) _____

Fig. 7 Infographic narrative frame

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Declarations

Ethical Approval Informed consent was obtained from all individual participants involved in the study. Prior to giving their consent, participants were informed of both the focus and procedures of this study and reminded that their identities would remain anonymous and that their participation was voluntary.

Conflict of interest The author declares no competing interests.

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