Article

Exploring the Use of Minecraft in Sámi Teacher Education

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Abstract: This article explores the integration of digital games, specifically Minecraft, within Sámi educational contexts. The qualitative case study was based on a development project in Sámi teacher education, exploring key aspects highlighted by pre-service teachers when using Minecraft during their practice periods with primary school children. Given the significant role teachers play in instructional organisation, this article aims to identify specific areas where pre-service teachers may benefit from additional support and training to enhance their preparedness for the classroom. Incorporating Sámi educational frameworks and digital competencies into Sámi teacher education, we utilised the digital competence of future teachers (DCFT) model to guide data collection and analysis. This involved distributing anonymous online questionnaires to pre-service teachers ($n = 17$). Our findings indicate the transformative potential of digital games in Sámi education, particularly in the use of Sámi as a gaming language and Sámi cultural game content. The article emphasises the relevance of digital technologies in preserving and revitalising Indigenous languages and cultures to better understand how to leverage these tools effectively in culturally relevant ways. By utilising contemporary digital tools within an Indigenous education, educators can enhance cultural continuity and empower Indigenous communities in the digital age.

Keywords: pre-service teacher education; Sámi education; Sámi language; game-based learning; Minecraft in education; teacher role; cultural game content

1. Introduction

This article examines the utilisation of Minecraft in Sámi teacher education. The project presented herein offers valuable insights into teacher education programmes, shedding light on instructional strategies and resources for preparing future educators, particularly in the Indigenous teacher education field. Shah et al. (2024) highlight Minecraft's growing popularity as a tool for play and cultural expression within Indigenous communities worldwide. They underscore Minecraft's potential as a platform for preserving and promoting cultural heritage, offering a cost-effective framework for educational innovation. This article explores the potential of digital games within Sámi education and teacher education.

As play is such an integral part of how knowledge has been passed down through generations in Indigenous and Sámi pedagogy (Äärelä 2016; Laiti and Frangou 2019), digital games can provide a method to facilitate the integrated use of Sámi learning and teaching methods within Sámi teacher education. Echoing sociocultural learning and teaching theories (Lier 2007), digital technologies such as Minecraft can 'afford users to move beyond existing practices and pave the way for new ones' (Lund et al. 2014, p. 284), not just as digital artifacts but as ideal practices and potential for new opportunities (Lund et al. 2014). Minecraft, as an open-ended sandbox game, offers unparalleled opportunities for creativity, play, and exploration in a digital environment. Laiti (2021) suggests that digital games and game creation can empower Sámi communities to narrate their stories and safeguard cultural traditions. Similarly, Garcia-Fernandez and Medeiros (2019) describe Minecraft as an optimal medium for storytelling and cultural representation.

Prior research has elucidated the benefits and challenges of incorporating games into educational contexts (Karsenti and Bugmann 2017; Nebel et al. 2016). Baek et al.'s (2020) literature review of Minecraft's educational potential indicates challenges such as the absence of clearly defined learning objectives, lacking gaming skills, and navigating inflexible curricula. At the same time, the same literature review underscores the capacity to enhance curriculum integration and facilitate the acquisition of knowledge and skills. It depicts students as 'engaged, interested, and enthusiastic when Minecraft is employed in science, math, social sciences, and language arts and composition classes' (Baek et al. 2020, p. 1).

Our project seeks to elucidate the perspectives of pre-service teachers regarding the integration of Minecraft into Sámi education, specifically tailored to Sámi cultural values and pedagogical principles. Specifically, we inquire:

What aspects do pre-service teachers highlight while utilising Minecraft during their practice period?

The article aims to demonstrate how Minecraft can be seamlessly integrated into Sámi teacher education programmes, emphasising language preservation, culturally relevant content, and pedagogical authenticity. Our theoretical framework draws from insights into Sámi cultural practices, educational perspectives, and cultural aspects of digital competencies to inform the design and implementation of Minecraft-based learning experiences. By contextualising the use of digital games within the unique cultural and educational landscape of Sámi communities, we aspire to foster a more inclusive and effective approach to Sámi education.

2. Previous Studies of Digital Competencies and Games in Indigenous Teacher Education

The professional digital competence required of teachers is recognised as complex, multifaceted, and situated, even more so than in many other professions, due to its inherent complexity and the high demands it entails (Carpenter et al. 2020; Howard et al. 2021; Mishra and Koehler 2006; Skantz-Åberg et al. 2022). Given this complexity, pre-service teachers must be adequately prepared, placing specific demands on both teacher education and the competencies of teacher educators (Uerz et al. 2018). Pre-service teachers and teacher educators are expected to participate in meta-reflection concerning the integration of technology with pedagogy and its impact on learning within specific contexts (Skantz-Åberg et al. 2022). In Indigenous and Sámi education, it is particularly relevant to identify how cultural and contextual dimensions can be part of the digital competencies, thereby using technology to enhance 'the ability to live and work effectively in culturally diverse environments and enact a commitment to equity and inclusion' (Goodman 2020, p. 41).

Korte et al. (2023) identify four types of digital knowledge-based competencies as part of the cultural and contextual dimensions of digital competencies, namely techno-cultural, self-cultural, micro-cultural, and intercultural. Techno-cultural knowledge encompasses both practical and contextual digital understanding. Self-cultural knowledge entails the need for self-awareness, as well as awareness of social identities and cultural influences, enabling teachers to blend pedagogical knowledge with technological potential. This knowledge necessitates an awareness of self-identity and culture, as well as self-reflection. Micro-cultural competence deals with knowledge about learners' social identities in a classroom, as well as understanding how cultural influences intersect. Thus, micro-cultural competence involves teachers having practical knowledge about how to guide and support pupils using different digital tools and applications. Lastly, intercultural competence includes 'skills to engage and communicate across individual, cultural, and societal differences' along with 'contextual and content knowledge to facilitate the digital competence required for technology-mediated teaching' (p. 10).

The increasing availability of technologies not only demands specific competencies but also offers expanded opportunities in education, introducing innovative ways of

teaching with new technologies, media, and modalities. Consequently, digital technology can facilitate new approaches to situated learning and enable meaningful interactions in education (Tumelius et al. 2022). In teacher education, digital tools and platforms can both facilitate new approaches to learning and, according to Aikio (2009), support pre-service teachers' problem-solving abilities and creativity, as well as deep learning. Digital tools can also support Sámi principles of pedagogy, such as the teacher being in a guiding, advising, and trusting role, and the pupils' roles being autonomous, active, and flexible (Keskitalo et al. 2012). Nevertheless, the ability to incorporate digital tools in a culturally relevant manner places specific requirements on the digital and didactic competencies of teachers (Uerz et al. 2018).

Digital tools and games can further serve as key elements in promoting Indigenous language revitalisation, storytelling, and traditional knowledge (Cocq 2013; Jokinen et al. 2017). In 2022, 76% of individuals in the 9–18 age group in Norway played digital games, Minecraft ranking among the top three most popular games across gender (Norwegian Media Authority 2022). Considering that a large percentage of people play digital games, the implementation and availability of more in-game languages and cultural content have the potential to play a significant role, not least in educational contexts. Aikio (2009, p. 15) emphasises that it is crucial for teachers in Sámi schools to be able to create and use diverse learning materials, including versatile digital learning materials and platforms. Creating such resources can fill a lack of culturally relevant teaching materials in Sámi education (Broderstad 2022; Nutti 2018), encouraging Indigenous peoples to be producers rather than merely consumers of technology and digital games (Loban 2023). Such game creation can function as social, inclusive, and empowering ways of knowing and learning, as well as sustaining intangible cultural heritage (Kultima and Laiti 2019; Laiti 2021; Laiti et al. 2021; Laiti and Frangou 2019). Given the extensive history of cultural representation and mis-representation in videogames (Dillon 2008), Indigenous sovereignty in game development processes is crucial for realising the benefits outlined. When developing game content, access to digital technology and understanding its usage are also crucial to prevent a digital divide between individuals with and without access (Meighan 2021).

Indigenous game development can place Indigenous knowledge systems and cultural practices in the centre (Nijdam 2022, 2023) and 'be dynamic sovereign spaces for Indigenous representation and expression when the self-determination of Indigenous people is supported' (LaPensée et al. 2022). As demonstrated by Laiti (2021) and Nijdam (2023), digital games and game design can embody Indigenous methodologies.

> [G]ames produced by and for Indigenous people are capable of presenting storytelling traditions as contemporary, interactive, and constantly evolving, incorporating traditional themes as much as contemporary issues that are being perpetually redefined by modern Sami experience and new technologies. (Nijdam 2023, p. 3093)

Game creation in Sámi teacher education can thus have the potential to further storytelling traditions as well as contemporary issues, creating and using culturally relevant teaching material for Sámi education.

3. Materials and Methods

3.1. Implementing the Minecraft Project in Sámi Teacher Education

The Sámi University of Applied Sciences is a unique institution, founded as the first Sámi education institution to safeguard and develop 'the Sámi language, culture, land, and traditional ways of living' and 'combining the Sámi traditional knowledge with academic and scientific knowledge' (Sámi University of Applied Sciences n.d.). The Sámi teacher education programmes at the Sámi University of Applied Sciences have a heightened focus on language (Nutti 2023), with content mainly delivered in North Sámi. One can attend the teacher education using other Sámi languages such as Lule and South Sámi, writing and taking language courses in the respective languages (Nutti 2023). As North Sámi is the main language used at the university, all participants in the current project

used North Sámi and the second author is a North Sámi language speaker; thus, we relate to the North Sámi language context and environment. We acknowledge that the Sámi University of Applied Sciences offers a unique context and understanding of Sámi values and pedagogy. The utilisation of Minecraft in Sámi teaching contexts is likely to vary as social and geographical contexts change. In the discussion section, diversity is therefore incorporated as an additional dimension.

This article builds upon a Minecraft practice project conducted yearly from 2021 to 2023, where pre-service teachers participated in workshops focusing on the didactical use of Minecraft. The authors conducted the workshops and organised practice projects. All pre-service teachers were present at the same gathering, in line with Sámi teacher education principles about teaching and learning in experience-based, interdisciplinary collaborative working arenas (see Nutti 2023). They subsequently developed their own projects to be tested during practice periods. In the workshops, the pre-service teachers tested Minecraft examples and were encouraged to create projects thematising Sámi language and culture. Project criteria were kept open to minimise the influence on the pre-service teachers' own projects. The pre-service teachers who participated more than once sometimes included experiences from several iterations in their responses. There was a large amount of diversity in the schools where the pre-service teachers had their practice periods, but the main practice places were Sámi schools and Sámi classes. Having gained experience from utilising Minecraft on more occasions in such diverse contexts enabled the pre-service teachers to provide more reflective and broad answers to the qualitative questions in the current study.

3.2. Data and Material

The current article presents a qualitative case study conducted using an online questionnaire. The primary objective of a case study is to portray the core aspects of a phenomena, in this case the potential of using digital games such as Minecraft in Sámi teacher education, and to understand this phenomena's significance and variations, while also deriving new insights. This approach aims to gain a comprehensive understanding or broad understanding by using a single unit (Gerring 2004; Yin 2009); in this case, the pre-service teachers' insights about the use of Minecraft in practice periods. The form of case study is often described as an interpretive or descriptive study that can give voice to participants and provide knowledge where there is a lack (Schwandt and Gates 2017). In this case, there is no previous research about the use of Minecraft in Sámi teacher education.

To answer what aspects pre-service teachers (n = 17) highlighted while utilising Minecraft during their practice periods, the pre-service teachers answered anonymous online questionnaires in spring 2024 using Nettskjema, a survey tool developed by the University of Oslo. The questions were developed by both authors who had regular meetings about the study and overall project throughout the project period. The questions were developed with input from the four types of digital knowledge-based competencies identified by Korte et al. (2023) in the model of digital competence for future teachers (DCFT).

The questionnaires were grouped into three overall topics: (1) background information on previous Minecraft experience and the utilisation of Sámi language and cultural content within Minecraft (questions 1–5); (2) experiences playing in the classroom, encompassing types of Minecraft lessons, how pupils played together, and relational aspects including the teacher's role (questions 6–10); and (3) the pupils' language use, covering communication, language use and multilingualism, and the relationship between Sámi content in the game and playing experiences (questions 11–15). What constitutes 'Sámi content' was not defined, leaving it open to respondents' interpretation. While the first-year students did not participate in the Minecraft project, those present at the physical gathering were still invited to complete portions of the questionnaire. The first-year students (n = 3) answered questions focusing solely on the background information section (questions 1–5), along with two additional questions concerning classroom use (questions a. and b.). This was conducted to gauge differences in language use and experiences with cultural content, as

well as to gather expectations about future Minecraft projects. For specific questions, see Appendix A (English and North Sámi). Direct quotes from the questionnaires are used throughout the result section. The material is analysed according the four types of digital knowledge-based competencies identified by Korte et al. (2023).

3.3. Ethical Considerations

Qualitative case studies can produce knowledge relevant for educational practice (Merriam 1998), even with a limited number of participants within small or unique cultural communities. The Sámi University of Applied Sciences serves a small Indigenous population (Keskitalo et al. 2012). The participant size in this study represents the community, which is small, and therefore might bring forward representative knowledge about the phenomenon being studied. In line with Hindmarsh (1996) and Keskitalo et al. (2012), we shifted the focus from smallness to cultural authenticity and Sámi values. Thus, the article answers a need to discuss how digital competencies can further language planning that is future-oriented and adheres to cultural and contextual dimensions in Sámi teacher education.

However, conducting studies involving participants from small communities must prioritise upholding ethical standards and principles (Damianakis and Woodford 2012). In this project, extra precautions were implemented to safeguard the anonymity of the participants through careful consideration of how information was provided and the selection of methods. To maintain the anonymity of the pre-service teachers and minimise the authors' influence on the responses, anonymous questionnaires were chosen. To ensure that participants were informed about the requirements and the significance of their contributions, the questionnaire was administered during a physical gathering. In the gathering, participants were briefed on the development project, as well as its conduct and purpose. The participants had the opportunity to reach out to the authors while answering the questionnaire if any questions or concerns arose. It was emphasised that participation was voluntary.

While questionnaires offer advantages, such as anonymity, there are potential risks, including subjective assessments, and concerns regarding the quality and relevance of content (Taherdoost 2016). To address these risks and ensure the quality and ethical standards of the questionnaire, it was developed and analysed with insights from the four types of digital knowledge-based competencies identified by Korte et al. (2023). The results may provide findings about the particular group, namely pre-service teachers at the Sámi University of Applied Sciences, that relate to the North Sámi language environment and have had experiences using Minecraft within Sámi education.

4. Results: Sámi Language, Game Content, and Teacher Role

When describing the use of Minecraft in practice periods, the pre-service teachers highlighted how pupils use Sámi language and how the game content affects this usage. Further, they highlighted the role of the pupils and pre-service teachers as well as their relations while playing. Language use and Sámi game content are closely intertwined yet remain distinct, as the content encompasses various aspects of language use such as general communication while playing and how game content may affect language choices. In this section, the data are organised according to these main themes. In certain instances, numbers are displayed as percentages to offer an overview; however, due to the limited sample size, the results lack statistical significance.

4.1. Sámi as a Gaming Language

To understand what linguistic aspects pre-service teachers highlighted, descriptions of how both pre-service teachers and pupils use Sámi while playing can be significant. Focusing on both pre-service teachers and pupils allows for a comprehension of how pre-service teachers can facilitate the use of Sámi as a gaming language. Among the pre-service teachers, a noticeable difference in Sámi language use was observed between those in

their first year of teacher education and those in the remaining years. The participants from the first year of teacher education had varying levels of experience playing Minecraft, ranging from little to extensive knowledge. However, none of them reported using the Sámi language while playing, even if their intention was to socialise. In comparison, 85.71% of respondents from other grades reported using Sámi while playing. The one participant that reported not using Sámi language had no prior experience playing Minecraft. While the number of respondents is too low to draw definitive conclusions, the answers still indicate that for digital gaming spaces to serve as arenas for socialisation and learning in Sámi (Laiti and Frangou 2019), it is crucial for the context in which the game is used to support the use of Sámi as a gaming language. The pre-service teachers are thus required to possess self-cultural knowledge to be able to meta-reflect on how their language use affects the pupils. Based on our data, it is not possible to determine whether the pre-service teachers previously used Sámi as a gaming language. However, one can argue that the use of Minecraft within teacher education either introduced Sámi as a gaming language or strengthened its usage.

The pre-service teachers also reported on the gaming language used by the pupils. Of these, 35.71% answered that the pupils exclusively used Sámi language, while none reported solely using Nordic languages. However, they indicated that the pupils used Sámi in conjunction with English, a Nordic language, and Norwegian. One participant reported that the pupils exclusively used English. This last response is likely linked to the pre-service teacher's indication of using Minecraft as part of an English lesson. Notably, only one respondent reported pupils exclusively mixing Sámi with a Nordic language, while all other instances of mixed language use involved English as one of the languages. The predominance of Sámi as a gaming language in most of the classroom could be attributed to various factors. The very context of being in a Sámi educational environment itself will serve as a supportive language arena. Interpreting the material, one can comprehend the support of pupils' use of Sámi language as a form of techno-cultural knowledge, wherein pre-service teachers facilitated the technological potential of using Sámi while playing through practical contextual knowledge and understanding. The social identities of both Sámi pupils and pre-service teachers were integrated into the digital game platform through intercultural competence, enabling teachers to 'engage and communicate across individual, cultural, and societal differences' (Korte et al. 2023, p. 10). This integration involved the application of both contextual and content knowledge when incorporating technology and digital games into the classroom. The pre-service teachers thus facilitated pupils' interaction with, and experience of, language in new or expanded domains through the integrated use of technology (Galla 2016).

Despite predominance of Sámi in a Sámi language arena, the reporting of mixed language use suggests that language choice was not solely determined by the school context. The game itself may offer certain affordances and language constraints (Darvin 2016). One such constraint can be knowledge of game terminology.

> One can hear many English words, otherwise Sámi. It depends a lot on the group of students who speak the language they speak. In Minecraft, these items don't have Sámi names, so we pronounce them in Norwegian or English. [Gullojit olu eaŋgalasgiel doahpagat, muđui sámegiella. Dat lea olu oahppijoavkku duohken Makkár giela hupmet. Minecraftas eai leat diŋgain sámegiel namahusat nu ahte davja geavahit dalle dárogiel dahje eaŋgalasgiel.] (pre-service teacher, year 4–5)

Minecraft offers a significant array of items for gameplay, and players may only be familiar with the names of these items in English or a majority language. The findings suggest that if pre-service teachers and pupils lack Sámi game terminology, they will switch languages, underscoring the necessity to develop and implement such terminology to realise technological potential. The pre-service teachers might lack contextual and content knowledge, either because they do not have the current knowledge or because it is not yet developed, thus hindering the practical implementation of digital games within a Sámi language environment.

In general, English often serves as a dominant gaming language, perhaps especially in multilingual areas (Larsson et al. 2023), with other majority languages holding similar dominant positions. That Sámi continues to hold a predominant position when using digital games within the Sámi classroom can thus play a vital role, with pre-service teachers playing an important role in guiding and enhancing this usage by blending pedagogical knowledge with technological potential. The findings demonstrate that pre-service teachers recognise gaming language as an important linguistic aspect of learning with digital games, underscoring the significance of integrating digital games within contexts where there is an expectation to use Sámi language.

4.2. Sámi Game Content and Its Effect on Pupil's Language Use

Pre-service teachers highlighted the role of Sámi game content and its effect on pupils' language use. To understand what role Sámi game content can play in the classroom, it is relevant to consider what Sámi game content entails. All participants in the study were enrolled in Sámi teacher education programmes. Therefore, one could argue that all content they or the Sámi pupils created can be considered Sámi, adding a cultural layer to the play experience. The discussion of what is considered Sámi content in a digital game thus requires a self-cultural competence to facilitate a meta-reflection about the integration of digital games. The pre-service teachers sometimes used Sámi content as an overarching category, while at other times, specific items such as traditional activities, reindeer, and scooters were mentioned explicitly as examples of Sámi content.

When describing how pupils interact with the Sámi content, pre-service teachers unanimously portrayed it favourably, attributing its beneficial effects to increased interest, involvement, and enhanced learning opportunities.

> They love the Sámi content, ESPECIALLY reindeers and scooters. [Sii ráhkistit sámi sisdoalu, EARENOAMAŽIID bohccuid ja skohteriid.] (pre-service teacher, year 1–3)

To guide and support these described opportunities, pre-service teachers would require micro-cultural competencies enabling a reflection of what learning opportunities might arise when pupils interact with what is described as Sámi game content.

The pre-service teachers further characterised Sámi game content as a significant factor for enhancing communication between pupils in Sámi, and the same applied when a majority language or English had a strong position as a gaming language.

> In traditional Sami activities, cooperation is carried out in the Sami language, most of the time in Norwegian. [Árbevirolaš sámi doaimmain lea ovttasbargu sámegillii, muđui dávjá dárogillii.] (pre-service teacher, year 4–5)

The connection between Sámi game content and language was confirmed by other pre-service teachers describing Sámi content as something that strengthens the communication between the pupils in Sámi. In particular, tasks that involved traditional Sámi activities were described as strengthening Sámi language use.

> Work with the reindeer is done in Sámi language. [Boazobarggut sámegillii.] (pre-service teacher, year 4–5)

One can presume that some of the pupils had real-life connections to these traditional tasks, such as having participated in, being part of, or having knowledge about reindeer herding where there typically is a strong connection to Sámi language (Sarkki et al. 2021). A strong language community could influence the language choice when interacting with similar activities in digital environments. As the pre-service teachers did not report on the real-life connections of the pupils, it was not possible to determine how the pre-service teachers utilised their micro-cultural competence to understand the pupils' social identities and cultural influences. However, the responses still underscore the potential of micro-cultural competence when working with traditional activities in Minecraft. Participating in such activities might offer an opportunity to acquire knowledge from both outside and

inside perspectives. Furthermore, it may provide access to activities that might not be readily available in the immediate area.

Interactions with nature, local and natural environments, and the environment's relevance for daily lives, work, and traditions shape terminology in a language. In a Sámi context, specialised terminology may include terms related to the natural environment, traditional activities, or handicraft (Eira et al. 2013). Pre-service teachers emphasised that Minecraft activities may enhance comprehension or the memorisation of terminology.

> A good platform to deliver traditional knowledge in a digital platform pupils use. Maybe they remember terminology better this way. [Buorre reaidu fievrridit arbevirolaš máhtu digitála plattforbmii man oahppit geavahit. Soitet muitit doahpagiid buoret nie.] (pre-service teacher, year 4–5)

The same respondent reported that they worked with both tradition and current events, indicating that this interaction was utilised to increase understanding of relevant terminology but not describing Sámi content as something that only comprises traditional activities.

> Linking minecraft to reindeer husbandry, being in the lávvu, sustainable future, historical events, and current issues. [Čatnan minecraft boazodollui, lávostallamii, guoddevaš boahtteáigái, historjjálaš dahpahusaide ja áigeguovdilis áššiide.] (pre-service teacher, year 4–5)

The pre-service teachers described how they, intentionally or unintentionally, established a connection between Sámi language use and what is regarded as Sámi content in the digital realm, thereby introducing a cultural dimension to this connection, blending pedagogical knowledge with technological potential. This encompassed both historical and current perspectives and events.

The pre-service teachers reported a wide variety of projects, which are listed below according to three categories: curricular topics and general play, cultural environments, and language (Table 1).

Table 1. Minecraft projects reported by pre-service teachers.

Curricular Topics and General Play	Cultural Environments	Language
Mathematics Geometry Sustainable future Historic and current events Learning about maps Well-known buildings Interdisciplinary topics Practicing numbers General play Learning Minecraft	Lávvu Snow world Reindeer husbandry, separation, and feeding Reindeer fence Premade Sámi Minecraft world[1] Energy in Sápmi Flag	Lavvú terminology Snow terminology Proverbs Playing in Sámi Alphabet Reading and writing Learning English

In addition to curricular topics, several projects encompassed cultural environments and language. These categories were often intertwined, exemplified by instances where pre-service teachers integrated mathematics into the construction of cultural buildings or objects, or utilised cultural settings when doing language tasks, building endeavours, or exploration of other curricular topics. In general, the pre-service teachers created a wide variety of original tasks that demonstrated aspects of their micro-cultural competence, showcasing their practical knowledge in supporting pupils with their digital content creation.

The notion of Sámi game content encompasses material that, in various ways, embodies Sámi culture, history, traditions, and languages. Across the responses, it became evident that this content was underscored as a significant facet of employing digital games in Sámi

education. It not only enhanced Sámi language usage among pupils but also fostered opportunities for a multitude of projects to be undertaken connected to curricular topics, cultural environments, and language.

4.3. The Role of the Pre-Service Teacher While Using Minecraft

To comprehend how pre-service teachers articulated their role as educators while utilising Minecraft, it is relevant to analyse how they organised and valued the roles of the pupils, as well as their chosen methods of interaction with them. One factor that appeared to influence organisational and relational aspects was the pre-service teachers' knowledge of the pupils' experience with Minecraft. While some reported being unaware of pupils' previous experience, others who were informed seemed to actively utilise this knowledge, demonstrating practical and contextual understanding as well as micro-cultural competence. The pre-service teachers employed this knowledge to organise pupils into groups based on experience, to structure the lesson plan effectively, and, importantly, to leverage the expertise of experienced Minecraft players. These pre-service teachers permitted the experienced players to assist both their peers and the pre-service teachers themselves, thus allowing certain pupils to act as valuable resources in the classroom.

> The pupils got quite free circumstances, because then I didn't need to help them, I don't have the same ability as most of the pupils. One example is when we were planning to take a picture together, which I couldn't, so the pupils helped us take it. [Oahppit ožžo oalle friddja eavttuid, go dalle in dárbbaš mun nu ollu veahkehit geas ii leat seamma ollu mahttu go eanaš oahppiin lea. Okta ovdamearka lea dalle go aigguimet oktasaš gova váldit, ja dan in mun máhttán, ni ahte oahppit veahkehedje dan čađahit.] (pre-service teacher, year 1–3)

As described, some pupils were allowed to play a pivotal role in facilitating the integration of Minecraft. Consequently, the pre-service teachers did not need to be experts themselves, as they could depend on the assistance of the pupils if technical guidance was needed. Pre-service teachers thus did not need complete digital content knowledge as this could, at least partly, be fulfilled by the pupils.

Not all pre-service teachers provided details on how they became aware of the pupils' knowledge, while others reported that they assessed the level of knowledge before incorporating Minecraft into the lesson, thereby consciously planning to gain that knowledge.

> I'll take a test before the game. Talented pupils have helped all of us. [Čađahan iskosa ovdal speallama. Čeahpes oahppit leat veahkehan min buohkaid.] (pre-service teacher, year 4–5)

Although the quote references a test, it does not detail the methodology employed. It could be interpreted as a simple assessment, particularly relevant if one is unfamiliar with the class or pupils, which is normal for a pre-service teacher at the beginning of a practice period. Such an evaluation could have been conducted through informal conversations with pupils before gameplay to identify potential helpers and those in need of additional assistance, thereby facilitating the required digital competence. This showcases the integration of digital competencies and non-digital classroom relations. An assessment of pupils' contextual knowledge could also have been carried out by allocating time for general gameplay before embarking on a specific task, thereby affording newcomers the opportunity to familiarise themselves with game mechanics. The utilisation of pupils as helpers was not only described as a resource in the Minecraft classroom but also as an inclusive practice, especially when the helpers were individuals who did not typically assume such roles.

Despite having pupils who could provide assistance, several pre-service teachers opted to play alongside the pupils. Specifically, 50% of the pre-service teachers played together with the pupils. Of the pre-service teachers who did not participate in joint gameplay, 28.57% cited practical reasons for not doing so, such as insufficient digital resources or poor internet connectivity, or because the pupils played in groups, thus presumably being with

a large number of peers. The remaining 21.43% explained that they did not play together with the pupils because they kept track of the class, helped organising the classroom or were not able to play themselves.

The pre-service teachers who played alongside the pupils reported that this approach enabled them to closely observe the pupils' actions, monitor their conversations, assess their collaboration, intervene in any conflicts that might arise, and foster discussions among the pupils.

> Yes, so that I could keep an eye on what they were doing and at the same time be involved and get the pupils to discuss. [Juo, nu ahte sáhtten čuovvut mielde maid sii dahke ja seammás leat mielde ja oažžut ohppiid digaštallat.] (pre-service teacher, year 1–3)

These pre-service teachers emphasised that their participation enabled them to offer guidance and support while fostering positive relations with the pupils. It appears that playing together allowed the pre-service teachers to provide guidance both within and outside the game, enabling them to communicate and facilitate across eventual differences, such as previous play experience and content knowledge.

> If the teacher is present in the world, it will be easier to interact with the pupils. [Jus oahpaheaddji lea mielde máilmmis, de lea álkibut gulahallat ohppiiguin.] (pre-service teacher, year 1–3)

The ease experienced when playing together corresponds to descriptions of how not playing together made the teaching situation more challenging.

> It was more difficult when they weren't in the same world, and I wasn't participating in the game. It was like a film which I can just hear. [Lei ollu váddát go eai lean ovtta máilmmis ja mun de mielde spealus. Lei dego livčče filbma maid dušše gulan.] (pre-service teacher, year 4–5)

The communal nature of Minecraft may alleviate concerns regarding varying levels of gaming expertise. Notably, several participants with limited previous Minecraft experience still played alongside the pupils, with some expressing enjoyment in the process. Additionally, not playing together was sometimes characterised as an obstacle. The pre-service teachers navigated a potentially unfamiliar situation, with several, even those with limited Minecraft knowledge, playing with the pupils when external factors allowed. This facilitated the creation of 'digital learning environments with consideration of the value of culture-based social learning' (Laiti and Frangou 2019, p. 9), blending pedagogical knowledge with technological potential. Previous research has described the lack of gaming skills as a primary obstacle when using Minecraft in the classroom (Baek et al. 2020). This lack does not seem to be as evident with the Sámi pre-service teachers.

The choice or wish to play together indicates that the pre-service teachers understand education as a collaborative endeavour involving both pupils and teachers. Playing together was further recounted as something that facilitated connections, even with pupils that might not be easy to connect with for some reason.

> The teacher has the opportunity to get to know those pupils who are not easy to approach. [Oahpaheaddjis lea vejolašvuohta oahppasmuvvat oahppiid geaid muđui ii leat álki lahkonit.] (pre-service teacher, year 1–3)

The quote illustrates that utilising games and playing together can offer opportunities to not only strengthen connections but also initiate connections that might otherwise be challenging to establish, furthering inclusive teaching practices. However, the positive guiding role, in which the pre-service teachers were creating connections, remained applicable even when they were not playing together with the pupils. The pre-service teachers indicated that they were conscious of establishing connections with the pupils. They reported taking on guiding roles to look after the pupils and their social connections. The guiding role of the teacher is in line with Sámi principles of pedagogy (Keskitalo et al. 2012), demonstrating a self-cultural knowledge that involves both a self-awareness of practical

circumstances and pedagogical knowledge. In the process, several of the pre-service teachers described that they used the pupils as a resource, communicating across varying levels and individual differences. Doing so enabled the use of contextual and content knowledge to facilitate learning in an environment that was simultaneously digital and physical. In general, playing with the pupils provided another socio-cultural approach to the classroom interaction where the teacher was not only an observer but also a participant and facilitator. One can assume that the Sámi pre-service teachers more naturally would participate in the learning process with the pupils in line with Indigenous ways of learning together.

5. Discussion

5.1. The Potential of Sámi as a Gaming Language

In the development project described in this article, insights from pre-service teachers highlighted the potential of Sámi as a gaming language when integrating digital games within Sámi language environments. Integrating digital gaming projects into Sámi teacher education can foster the use of Sámi as a gaming language, showcasing how the emphasis on language within teacher education programmes at the Sámi University of Applied Sciences (Nutti 2023) can seamlessly merge with digital game projects. The integration of Sámi language in digital environments can 'positively amplify existing linguistic and cultural practices' (Olthuis et al. 2013, p. 148), as demonstrated in earlier language revitalisation projects. Keskitalo et al. (2012) describe how teaching quality in Sámi education is dependent on 'how well the pedagogy is grounded in the Sámi culture' (p. 55), requiring a need to strengthen Sámi language. Therefore, employing Sámi language in digital games like Minecraft can ground the use of digital games within Sámi culture, supporting culturally relevant teaching methods. Such uses of technology will require technological proficiency and cultural and contextual dimensions of digital competencies.

In an article examining the influence of technology on Indigenous language learning and teaching across various Indigenous language contexts, approximately half of the respondents noted that 'technology attracts the younger generation, empowers language learners, and gives the language community ownership' (Galla 2016, p. 1144). Technological proficiency thus provides the opportunity to establish language communities, bridging digitally adept youth with elders possessing linguistic and cultural expertise. Our findings suggest that employing digital games may foster such meaningful relations between pupils and pre-service teachers as well, facilitating knowledge exchange and social aspects of learning. Sámi as a gaming language plays a crucial role in cultivating such meaningful and social learning relationships, also illustrating that using Sámi language could be a natural choice when playing digital games. Utilising Sámi during gameplay demonstrates that language is not confined to local contexts but can challenge English as a gaming lingua franca. However, research is necessary to ascertain whether pupils who use digital games in Sámi within a school setting continue to utilise Sámi as a gaming language or are more inclined to use majority languages or English.

Changing the gaming language, or having multiple possible gaming languages to choose from, requires an effort from the player. This effort extends to practical aspects such as navigating the game environment, where finding available game items that one is familiar with in one language can be more challenging when changing languages. Well-known items, such as certain natural materials, are one aspect to navigate in Sámi, but the navigation becomes more complex when searching for terms that are not available in real life, such as the names of game-specific living creatures (mobs) or specialised building materials. When establishing or evolving the use of gaming languages, there is a necessity to develop terminology that players can readily use. Previous revitalisation projects have described how lists of words and phrases have been made available for language learning in digital environments (Outakoski et al. 2018). Even though this effort encompassed lists for language learning itself, the making and developing of such terminology lists for using games in a Sámi educational context could contribute to revitalisation efforts.

When discussing Sámi Minecraft terminology, it is inevitable to mention the groundbreaking translation work conducted by Lemet Máhtte Eira Sara, who in 2020 translated Minecraft Java Edition to North Sámi. The effort involved translating 14,000 words and creating new terminology. Eira Sara's contributions were recognised with the Sámi Language Promotion Award from the Sámi Parliament on the Norwegian side of Sápmi (Sámediggi 2021). This translation work enables Sámi gamers to immerse themselves in a digital environment or metaverse where all language elements and content are in Sámi. The translation, however, is not necessarily available with Minecraft education, the version of Minecraft that is often used in school settings. However, Minecraft's adaptability allows the player to manually change terminology in-game if the player, or the teacher, has the practical technological knowledge. In a Sámi context, research is necessary to both distribute terminology lists and discuss current terminology that has been developed. Further, there is a need for development projects enabling more game platforms and versions of games such as Minecraft to be fully available in the Sámi language. Integrating games into education provides a language-rich environment that could support the development and integration of such terminology, normalising language use during gameplay. On the other hand, game terminology lists could support the use of digital games within Sámi language contexts. Research on, and exploration of, terminology development and its effects on language revitalisation efforts are therefore needed.

5.2. Digital Cultural Environments

Pre-service teachers within the projects created numerous cultural environments and highlighted how cultural content and environments within Minecraft supported the integration of Minecraft within a Sámi educational context. The use of digital games has been conceptualised as a form of cultural-technological practice, with game environments that can be likened to landscapes or geographies (Ash and Gallacher 2011). Minecraft in particular can be viewed as both a social and physical space (Quiring 2015), especially when utilised in a social setting such as a classroom. A digital tool can merge landscapes where the past and present intertwine, forming a learning arena, as described by Gaup (2009). By exploring places within a digital game, pupils may access new methods of interacting with known or unknown locations (Jones and Hafner 2021) and gain entry to places otherwise inaccessible. Some locations may have restrictions in real life, such as the need for guided tours or movement constraints. While guided tours are valuable, interaction in the digital world offers a different approach to exploration, fostering student-led and student-centred exploration. Such free explorations can be attained by giving both pre-service teachers and pupils quite free circumstances, as described in the current study. The criteria for the game projects were flexible, and several of the pre-service teachers highlighted that they gave their pupils freedom to explore. The project thus supported a flexible, active, and autonomous position of the pupils and students, in line with Sámi principles of pedagogy (Keskitalo et al. 2012). These digital experiences have the potential to complement physical and traditional connections to the land and provide new ways of playing and interacting with the digital rendition. Using the Sámi language within various settings, such as digital cultural game environments in Minecraft (see Table 1), can further an appreciation of the Sámi language and culture (Keskitalo et al. 2012). In this study, the potential of exploring within a Sámi game context was realised through, among other things, the pre-service teachers' creation of digital cultural environments where specific cultural tasks, language activities, and other curricular topics could be thematised, thus adding a cultural layer to the play experience.

As described in the results section, the pre-service teachers did not provide reports on their pupils' lived experiences or backgrounds. When integrating game projects into Sámi education, one could pay closer attention to the specific context in which the games are utilised, such as urban areas or different language environments. Berg-Nordlie et al. (2022) describe 'Indigenous urbanization' as 'a demographic phenomenon in which Indigenous populations concentrate in urban areas—either because of Indigenous migration to urban

areas or because areas where Indigenous people live become urbanized' (p. 3). Urban Indigenous life is not a novel concept, but urban areas often tend to be dominated or controlled by dominant groups, sometimes resulting in the social and geographic marginalisation of Indigenous cultures, even within Indigenous territories (Berg-Nordlie et al. 2022). Another aspect of such urbanisation may involve a diminished or more distant connection to land, simply because accessing certain places becomes more challenging. Reclaiming places using technology can thus be viewed as a form of technological decolonisation or as part of the decolonisation process of the digital landscape. Research is needed to compare the usage patterns and specific needs among different Sámi language environments and communities, such as South and Lule Sámi, urban contexts, weaker language environments, and its applicability in particular revitalisation efforts.

5.3. Sámi Content Creation and Pedagogical Practices

The development of digital game environments enables meaningful learning when pre-service teachers assume leadership roles and participate in relevant learning (Antonio and Diculen 2023). In this context, such relevant learning can happen when using digital games to reinforce principles fundamental to Sámi teacher education. One such principle is the importance of connecting teachings to 'Sámi livelihood experiences and the use of nature' (Nutti 2023, p. 50). As demonstrated by the projects created by the pre-service teachers in this study (see Table 1), the use of Minecraft enabled a multitude of possibilities to interact with, and create, experiences working with cultural environments and language use. It has been argued that when game design centres on Indigenous perspectives there is the potential to realign 'relationships of player to play environment' (Miner 2022, p. 17). When the play environments are cultural environments, Sámi livelihood experiences and nature use can thus become focal points of the play experience. The incorporation of digital games can provide novel teaching opportunities that enhance cultural content and language, demonstrating how pedagogical knowledge and cultural awareness can be realised through technological potential.

As demonstrated by other initiatives where games or game elements are implemented, utilising Indigenous games can offer new avenues to preserve culture, facilitate language learning (Saad et al. 2022), and make 'learning relevant to learners' cultural knowledge and worldviews' (Matsekoleng et al. 2024, p. 68). Consequently, Minecraft has the potential to serve as an innovative model used in Sámi education on Sámi terms and, if its usage continues, as a sustained effort for language and culture revitalisation, akin to previous initiatives on social media use in Sámi, as demonstrated by Outakoski et al. (2018). This sustained effort will rely on both game content and how the game is integrated within a Sámi context. Positioning pupils as resources and facilitating play between both pupils and pre-service teachers or in-service teachers can pave the way for social educational practices that align with Sámi principles of education.

A continued effort for language and culture revitalisation could be understood as part of Indigenous communities transitioning from being recipients, collaborators, and consumers to being producers of digital content and landscapes (Meighan 2021). Understanding what constitutes an Indigenous game and Indigenous game content is therefore important. In this study, Sámi game content was described as content representing Sámi culture, history, traditions, and languages, but also current events and sustainability. In Sámi education, it can therefore be particularly relevant to incorporate game creation projects or projects that utilise existing games that are reinterpreted to adhere to Sámi principles of education. This approach allows for the creation of culturally relevant teaching materials as well as testing applicability within Sámi school contexts. Furthermore, it encourages meta-reflections about the necessary digital competencies needed to integrate digital games into Sámi education.

6. Conclusions

In this article, we explore what aspects pre-service teachers highlighted when utilising Minecraft, focusing on gaming language, game creation, and the teacher role. Our analysis and discussion demonstrate the possible integration of Minecraft while prioritising language, Sámi content, and teaching practices that are in line with Sámi principles of education and teacher education. We argue that there are principles that facilitated the integration of Minecraft in Sámi education. It is vital that both the gaming language be fully in Sámi and that Sámi language and content support a learning environment that is culturally sensitive and meaningful. Thoughtful guidance of the pupils can be provided both outside and inside the game, depending on external factors such as the availability of devices and internet connection. We still consider it good practice for the teacher to participate in the game with the pupils, as this aligns more with Indigenous ways of learning together.

The current study relates specifically to the Sámi teacher education programmes conducted at the Sámi University of Applied Sciences and a North Sámi language environment. The results from this specific sample group highlight that techno-cultural, self-cultural, micro-cultural, and intercultural competencies are crucial aspects of the necessary digital competencies for integrating digital games into Sámi education. The results indicate the importance of understanding gaming language, game content, and the role of the teacher. Integrating these findings into Sámi teacher education is crucial to ensure alignment with Sámi educational principles. The emphasis on pre-service teachers' experiences with Minecraft can contribute to Sámi teacher education by demonstrating how the implementation of digital tools and knowledge can enhance cultural and contextual dimensions, language learning, culturally relevant teaching content, and considerations of how Sámi principles of education can be prioritised when utilising digital games. The experiences gathered from this study indicate that there is a need to systematise pedagogical principles of game-based learning in Sámi education, develop additional material such as game terminology, and perform research within Sámi schools to gain knowledge about the application of digital games. The findings in this study can be used as indications for future research on game-based learning in Sámi and Indigenous contexts; however, to highlight particularities of other Sámi language environments, separate similar studies should be conducted.

Appendix A. Questionnaire Distributed to the Pre-Service Teachers

Topic 1: Background information

1. How much have you played Minecraft by yourself? (none, a little, medium, a lot) Man olu leat speallan Minecraft spealu? (in ollenge, unnan, muhtun veardde, ollu)
2. If you have experience playing Minecraft in your free time, what do you like to do while playing? *Jus dus leat vásáhusat ástoáigge speallamis, maid don liikot dahkat spealadettiin?*
3. Do you use the Sami language or Sami content while playing? *Geavatgo sámegiela dahje sámi sisdoalu spealadettiin?*
4. If you do, what kind of content do you use? *Jus geavahat, maid geavahat?*

Both written and oral language—*Sihke čállingiela ja njálmmálaš giela*
Only written language—*Beare čállingiela*
Only oral language—*Beare njálmmálaš giela*
Create Sámi content—*Ráhkkadit sámi sisdoalu*
Use Sámi content created by others—*Geavahit sámi sisdoalu man earát leat ráhkkadan*

5. Do you have examples of this use? *Leatgo dus ovdamearkkat dáid geavaheamis?*

To first year students:

   a. What kind of expectations do you have of using Minecraft in the classroom?

Makkár vuordámušat dus leat Minecraft geavaheapmái luohkkálanjas?

   b. Have you played Minecraft together with somebody? If you have, what were the roles?

Leatgo don speallan Minecraft ovttas earáin? Jus leat, makkár rollát dis ledje?

Topic 2: Playing in the classroom

6. What kind of Minecraft projects have you used in the classroom? Briefly name topics and main ideas, for example, and the target group. *Makkár Minecraft prošeavttat dus leat leamašan klássalanjas? Muital oanehaččat fáttáid ja váldojurdagiid ja čuozahanjoavkkuid.*
7. Did you know the pupils' background or playing skills? If you did, how did you use that information when designing your Minecraft project? *Dihtetgo makkár lea ohpiid speallanmáhtu? Jus dihtet, movt ávkkastallet dan Minecraft prošeavttas?*
8. Describe how pupils played together, how they communicated, what their roles were and their behaviour while playing together. *Muital spelletgo oahpit ovttas, movt sii kommuniserejit, makkár rollát sis ledje ja movt lei sin láhtten speallama áigge?*
9. Did you participate while pupils were playing? Why or why not? *Oassálastetgo don speallamii go oahpit spelle? Manin dahje manin it?*
10. How was the relation and communication, discussion, and teacher role when playing? *Makkár lei oktavuohta ja vuorrováikkuhus, ságastallan, oahpaheaddji rollá?*

Topic 3: Language use

11. Did the children converse while playing? *Ságastalletgo oahppit spealadettiin?*
12. In what language did the pupils play? *Man gillii oahppit spellet?*

Sámi
Nordic language—*Dávviriikkaid gielat*
English—*Engelasgiella*
Mixed language (Name the languages below)—*Máŋggagielat (Namut gielaid vuollelii.)*

13. Describe if there was a multilingual situation and code switching while playing? *Muital jus spealadettiin lei maŋggagielat dáhpahusat dahje kodaid molson ohpiid gaska?*
14. What topics did they discuss, and did those topics support the playing? If so, how? *Makkár fáttaid birra oahpit ságastalle ja movt dát fáttat dorjot speallama?*
15. Did the Sámi content in Minecraft support pupils' cultural knowledge? If so, how? *Movt Minecraft sámi sidoalu dorjjot ohpiid kultuvrralaš ipmárdusa?*

Note

1 Refering to a large Sámi Minecraft game developed in a collaboration project in which both authors participated.

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