Education in the North

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ARTICLE

Flipped learning for novices and advanced yarn-crafters in higher education

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DOI Number: https://doi.org/10.26203/rt43-8676

To cite this article: Härkki, T. *et al.*, (2023). Flipped learning for novices and advanced yarn-crafters in higher education. *Education in the North*, **30**(2) pp.101-119.

Flipped learning for novices and advanced yarn-crafters in higher education

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Abstract

This research examines student craft teachers' learning in the context of two yarn-craft courses utilising flipped learning to provide inclusive and encouraging learning experiences for all students, despite their significantly differing skill levels. A similar challenge of identifying and implementing pedagogical approaches that account for students' differing entry-level skills exists for several higher education programmes, especially in domains with indirect continuation of compulsory high school courses. Experiencing courses as too easy or too demanding has a negative impact on student achievement. Therefore, this research asks how students participating in these courses described their learning and whether novices and advanced yarn-crafters were content with the flipped-learning implementations. From the two yarn-technique flipped-learning courses, 51 student craft teachers participated in this study. Students were instructed to set their own learning goals and conduct self-assessments. All student-provided materials were collected as research data and analysed using thematical qualitative analyses. The results show that the possibility of tailoring their learning directed students' learning in personally meaningful directions. However, the need for teacher support was not determined by yarn-craft skills alone, but also by students' regulation of their own learning. For teachers, flipped learning provides an impressive window into students' diverse learning needs.

Keywords: flipped learning, yarn crafts, thematic analysis, self-regulation of learning, in-class interaction

Introduction

Teachers in several higher education (HE) programmes are challenged to identify pedagogical strategies that provide motivating learning experiences for students with differing entry-level knowledge and skills. In this study, we discuss the need for the increased individualisation of learning yarn crafts in craft teacher education (CTE). This need was incited by the paradigm shift in the subject of crafts in Finnish basic education as the CTE curriculum needs to reflect the basic education craft curriculum.

In the current Finnish multi-material craft subject, all pupils can be taught, for instance, yarn-based technologies, as crafts are no longer divided into technical and textile craft domains. The National Core Curriculum of Basic Education (NCCBE) neither defines nor restricts the technologies to be taught. Rather, "activities are based on craft expression, design and technology" (Finnish National Board of Education [FNBoE], 2014, p.155). A somewhat similar yet earlier alignment of craft education took place in the United States, Scotland, England, Sweden, Australia and New Zealand (Lepistö, 2004). However, the egalitarian NCCBE objectives have not been actualised, and basic education pupils graduate with varying skillsets in crafts (Hilmola, 2023).

Similarly, students entering CTE programmes possess various degrees and combinations of craft skills. This variation naturally reflects students' free-time activities (and for some, their vocational degrees), but also the gender-segregated subject content (Kokko, Kouhia and Kangas, 2020) – a long-lasting tradition that should have perished, given the current NCCBE. However, after five years of CTE studies, students should be proficient teachers of multi-material crafts, including yarn crafts.

Experiencing courses as too easy or too demanding is demotivating. Subsequently, the need for inclusive pedagogical solutions is obvious in CTE. By inclusion, we not only refer to learners with special needs, but to learners who have all kinds of different physical, cognitive and social backgrounds (Qvortrup and Qvortrup, 2018). Rather than sorting the student population into various groups based on named diversities (i.e., disabled), this kind of pedagogy aims at constructing all students as capable of doing and learning (i.e., able). While pedagogical approaches to tackling the problem of individualising learning in HE appear under-researched, approaches such as flipped classrooms and flipped learning (FL) have been recognised as potential solutions to serve diverse student populations (Goedhart, Blignaut-van Westrhenen, Moser and Zweekhorst, 2019). FL is a pedagogical framework that has received a multitude of implementations in various HE domains (Birgili, Seggie and Oğuz, 2021). Yet, Abeysekera and Dawson (2015, p.2) argue that FL "is under-evaluated, under-theorised and under-researched". They recognise that, theoretically, FL has the potential to cater to student motivation, but call for more explicit empirical research on the topic.

However, the paucity of FL research in the teaching of crafts or other skills relying on the coordination of perception, cognition and fine motor skills provides few (if any) models for straightforward adoption. In this study, we delineate two FL implementations with the shared objective of promoting inclusive learning within the context of Finnish CTE. The aim of our study is to examine student craft teachers' learning in two yarn-based craft courses with differently oriented FL implementations.

Teaching and learning yarn crafts

In this study, we understand learning as the acquisition of new knowledge, skills or capabilities, while teaching – implementing carefully chosen pedagogical approaches – aims to facilitate learning. In learning crafts, senses and fine motor skills play an elemental role. The changing role of the senses is recognised by Romiszovski's (1999) five-phase linear model of learning a physical skill: information acquisition (what, why, in what order and with what tools and means) is followed by step-by-step performance under the learner's own visual control. Next, control changes from visual to kinaesthetic or to other senses; then, the skill becomes automated (i.e., it requires no conscious attention) and finally, the skill can be transferred to new contexts.

Syrjäläinen (2003) takes a different viewpoint in her model, which recognises skill learning as a teacher–learner interaction where craft learning is cyclical and divided into three phases: perceiving, practising and interpreting. Successful perception requires the learner's attention to be directed at technique demonstration followed up by the teacher's questions, which ensure knowledge acquisition. Practising requires the learner's capacity to enact the perceived technique and persevere through deliberate practice. To overcome this critical phase, some learners need personal guidance and support. Interpretation entails (teacher-facilitated) explication, reflection and assessment, and when successful, it can result in skill transferability (Syrjäläinen, 2003). Taken together, Romiszovski (1999) and Syrjäläinen (2003) provide a view on handcraft skill learning involving attention, senses and deliberate practice that takes time and reflection.

However, yarn-craft pedagogy involves more than techniques. An important characteristic of crafts involves its connections to local and national cultures (Lepistö, 2004), as stated in the current NCCBE. Yarn crafts involve indigenous and local knowledge consisting of "the knowledge beliefs, traditions, practices, institutions, and worldviews developed and sustained by indigenous and local communities" (Vandebroek, Reyes-García, de Albuquerque, Bussmann and Pieroni, 2011, p.1) that outline the origins and meanings of craft as an important part of the maker's life (Rodríguez-Burgos, Díaz-Posada, Rodríguez-Castro, Izquierdo-Martínez and Nassar-Pinzón, 2014). Indeed, yarn-craft techniques are core elements in school crafts, and yarns provided for pupils as basic materials (Kouhia and Kokko, 2022). Post-school, many makers develop their craft techniques into lifelong hobbies (e.g., Sjöberg and Porko-Hudd, 2019).

Knitting, in particular, has a strong tradition in Finland; thus, it may be considered "a people's craft" that is widely practiced by non-professionals (Rutt, 1987, p.25). According to Shin and Ha (2011), knitting practice integrates consumption and production and mental and physical activity, while generating "its unique and ambiguous characteristics and status" (p.105) through the purchase of materials, designing, physical labour and the production of material goods. Indigenous knowledge may be materialised in knitting, for instance, in the way in which stitches are made, needles are held in a particular knitting position (Pink, 2019) and in the ways of processing materials for knitting (Bhatt and Saha, 2014). These forms of indigenous knowledge may have been developed and passed down through generations within the local maker communities (Koskennurmi-Sivonen, Anttila and Virtanen, 2008; Pink, 2019; Rutt, 1987), yet their origins and meanings are continuously reinvented in the changing social, economic,

political and technical milieus in which they prevail (see Mann, 2018; also Kouhia, 2020). However, in terms of the indigenous embodied knowledge of practice, it has been argued that once the basic skills and movements have been learned, it might be difficult to change the preferred ingrained movements later in life (Pink, 2019). Therefore, our notion of yarn-craft pedagogy for HE recognises the complexity in student skills and resources for learning and the manner of learning, especially with regard to background knowledge and individual culture, as advocated by Howard and Aleman (2008).

Flipped learning

In FL, the word *flipped* refers to reversing the treatment of space, time and activity in learning design (Talbert, 2017). Traditionally, a teacher introduces instructional material to students in class (in the collective learning environment), after which the students leave to complete (often individually) after-class higher-level learning activities, such as applying, evaluating, synthesising or creating. Teacher support for learning activities is highest during the easiest learning task. In FL, these dispositions are reversed (Talbert, 2017). In class, teacher-centred instruction is replaced by student-centred learning activities (Låg and Sæle, 2019) emphasising active learning, group work and problem-solving (Abeysekera and Dawson, 2015).

FL is characterised as a combination of face-to-face and virtual learning environments. Instructional videos, recorded lectures or other remotely accessible materials are utilised to introduce content to students before class (Goedhart et al., 2019). These materials can include e-books and quizzes, and depending on the particular virtual learning environment, the teacher can monitor student activity (Istiandaru, Setyawan, Hidayat and Istihapsari, 2019). However, recorded and other materials and classroom activities need to be balanced (Butt, 2014), which requires careful planning of the learning process and the teacher's subject-matter expertise (Sointu et al., 2019).

Meta-studies and systematic reviews attribute positive FL outcomes to collaborative learning and student–teacher interaction (Moffett, 2015; Shih, Liang and Tsai, 2019). For students, FL can provide flexibility, freedom and efficiency in out-of-class activities, as well as deep, engaging and collaborative in-class learning (e.g., Fraga and Harmon, 2014; Han, Røkenes and Krumsvik, 2022; Låg and Sæle, 2019). Some studies have resulted in increased student motivation (e.g., Lee, Lim and Kim, 2016; Yan, Li, Yin and Nie, 2018). Furthermore, integrating FL with support for students' self-regulation strategies can yield better learning results through improved self-efficacy, planning and use of study time (Lai and Hwang, 2016). For teachers, FL offers the possibility of tailoring learning processes to reflect student diversity by providing various alternatives for processes and activities (Abeysekera and Dawson 2015; Goedhart et al., 2019). Furthermore, in-class time is released for higher-level learning and supporting students' regulation of learning (Talbert, 2017).

The benefits are not imperative. Butt (2014) highlights the importance of understanding student diversity. Some students have been challenged by having to prepare for in-class activities and save their questions for in-class sessions rather than getting immediate answers and by increased workloads (Han et al., 2022). Difficulties have been caused by time management, technology and confusion about the required tasks (Fraga and Harmon, 2014). Several FL studies suggest that not all students are

skilled enough in goal setting, time management and help-seeking (e.g., Lai and Hwang 2016; Shih et al., 2019). These skills fall into the realm of self-regulated learning (SRL).

According to Zimmerman's (2002) cyclical SRL model, student learning processes and the accompanying motivational beliefs fall into three self-regulatory phases: forethought, performance and self-reflection. In practice, SRL entails setting specific goals for oneself, adopting purposeful strategies, monitoring one's performance, restructuring physical and social contexts for better achievement, efficient time management, evaluation of chosen methods, attributing causation to achieved results and adapting methods for future use (Zimmerman, 2002). Self-regulated students have initiative and perseverance, and they focus on activating, altering and sustaining their learning practices (Zimmerman, 2002); they are capable of tailoring their learning processes according to their needs. SRL is challenged by students overestimating their capacities, which is related to their willingness to accept and make use of critical feedback (Pintrich, 2003). While some (e.g., Pintrich 2003; Dianati, Iwashita and Vasquez, 2022) see SRL skills as a prerequisite for FL, some see FL as a way to learn SRL skills (e.g., Abeysekera and Dawson, 2015; Butt, 2014).

To summarise, it appears that FL implementations could result in more motivating and deeper learning. Yet they need to be carefully planned, reflect student diversity and account for a suitable level of support for student SRL. Next, we present our two differently oriented FL implementations.

Two yarn-craft courses

The studied two Bachelor-level courses, implemented in different Finnish universities, were obligatory for student craft teachers. The chosen FL approaches differed: Course 1 was more structured, providing FL for all students, while Course 2 provided FL as an option for advanced yarn-crafters. Both courses asked students to complete a self-evaluation of their yarn-craft skills at the beginning of the course. For both courses, the student profiles ranged from novices to intermediate and advanced learners. Novices had little or no previous experience with yarn crafts; they concentrated on learning the basics. Intermediate learners knew the basics but had not reached Romiszovski's (1999) fifth stage (automated skill) in, for instance, knitted sock heels. Advanced learners had the skills and capabilities to experiment with structures, such as lacework or cables, or different cast-on and decrease techniques; in the courses, they concentrated on developing their knowledge of the applied yarn-craft strategies.

Course 1 was an intermediate-level yarn-technology course, which revisited the basics of crochet and knitting that had already been taught in the first study year. The emphasis was on techniques, such as casting on, decreasing, sock heels and the basics of machine knitting. Furthermore, students could choose to practice with one or two special yarn technologies (e.g., nålebinding, tatting, or macrame). The learning goals emphasised visual and technical design and product making, but also learning to teach yarn crafts to learners of all ages.

The course began with two lectures, followed by seven group lessons (16 students per group). The lectures briefly introduced the required yarn techniques, visual and technical design, special yarn techniques and the FL implementation model for the group lessons. Each group lesson focused on a specific technique (crochet, flat knitting, machine knitting, etc.) and began with an orientation

discussion. Had the students recognised suitable learning goals? What kinds of live demonstrations were required and by whom? Those who felt they knew what to do could start their projects, while the rest of the group was divided into smaller learning groups according to their stated needs.

Before the group lessons, students watched one or more short videos demonstrating the basics of the technique, reflected on their skills and set individual learning goals by using a specific internet form. Unlike in a typical FL implementation, the teacher did not record these videos herself; rather, she chose the videos from the abundance of good quality internet videos presenting yarn-craft techniques and linked them to the course learning platform, Moodle. Students also received pass/fail criteria for each learning task (i.e., technique project) as a list of features that their project needed to fulfil. For instance, a crochet project needed to include five of the basic stitch types and a minimum of ten decrease and ten increase stitches. Students were free to design how to implement the required features in their projects. For novices and intermediate students, the teacher provided suitable examples to meet the learning goals, such as "learn to knit even-sized stitches," "learn to decrease and increase independently" and "learn to knit cable." These examples targeted reaching a skill level that enabled a learner to change his or her control from visual to kinaesthetic senses, the level preceding the skill becoming automated (cf. Romiszovski, 1999).

Course 2 consisted of four modules (woodwork, metalwork, sewing and yarn crafts), each comprising scheduled group lessons with separate learning tasks. For the students, this course was the first to touch on yarn crafts in this CTE programme. In the yarn-craft module, students developed awareness of the bodily, cognitive and social aspects of knitting and crochet through independent and collective study assignments. Through implementing tools, materials and concepts related to the techniques, the students improved their skills for assessing and developing craft knowledge for yarn-craft pedagogy.

The yarn-craft module consisted of an introductory lecture and four group lessons. During the group lessons, students devised student-set learning tasks for knitting and crochet and a final essay. Furthermore, advanced course students could choose to complete the module independently through an FL approach, with a learning set covering a) a preliminary self-evaluation, b) a course project with individual learning goals and c) reflection on course learning.

Research Questions

From these premises and within these contextual frames, we set two research questions:

RQ1: How did student craft teachers explicate their learning on an FL yarn-craft course?

RQ2: Were there differences in novice and advanced yarn-crafters' satisfaction with the studied FL course?

In the next section, we present our study participants, collected data and our approach to our thematical qualitative analysis, which is followed by a section covering the study results and a discussion.

Methods

For this qualitative case study, we acquired multiple kinds of data from two yarn-craft courses at different universities. Primarily, these data formats and data points were designed to serve pedagogical needs of our FL implementations, yet they simultaneously provided cross-sectional research data on student activities and learning for purposes of data triangulation. On the one end, we acquired written course reflections, and in the other end, highly structured qualitative survey data. As thematical analysis provides flexibility to choose themes according to their importance in relation to research questions rather than based on quantifiable measures (Braun and Clarke, 2006), we chose it to analysis method.

The study followed the ethical principles of research with human participants issued by the Finnish Advisory Board on Research Integrity TENK (FNBORI TENK, 2023) and implemented by both universities in question. All participating students gave their informed consent, their participation was completely voluntary, and they were informed that they had an unconditional right of withdrawal at any time and without giving any reason.

Study participants and acquired data

Course 1

Of the 49 students enrolled, 47 gave their informed consent to participate in this study. At the first lecture, a self-evaluation questionnaire was sent to students: 36 students submitted their named answers, based on which they were identified as novice (15), intermediate (6) and advanced (15) yarn-craft learners. This study focuses on advanced and novice yarn-crafters.

All student-provided documents (learning goals, self-assessments and artefact photos per each learning project), pre-course self-evaluations and post-course course evaluations were acquired as research data. Additionally, after the course, we approached 13 participants, of which 9 agreed to be interviewed. Five of these interviewees were novices and four were advanced yarn-technique learners.

Course 2

The study participants included four students. These students identified themselves as advanced yarn-crafters and chose the independent FL option. The data consists of individually set goals, study reports, and course reflections.

Data analysis

The two datasets were qualitatively analysed using thematic analysis, which is a method to identify, analyse and report on repeated patterns of meaning and is especially suitable when seeking an understanding of experiences, thoughts or behaviours across a dataset (Braun and Clarke, 2006; Kiger and Varpio, 2020). Braun and Clarke (2006) identify and describe several approaches towards thematic analysis, such as realistic versus constructionist, inductive/data-driven versus theory-driven, semantic versus latent identification of themes. Due to our analytic interest stated in our research aim and research questions, we chose to utilize realistic and theory-driven approach to thematical analysis. A realistic approach is suitable for studies on motivation, experience and meaning, and theory-driven thematic analysis gravitates towards a more detailed analysis of the chosen aspect of the data, rather than providing a rich description of the overall data (Braun and Clarke, 2006).

We followed the guideline by Braun and Clarke (2006) on performing thematical analysis through six analytical steps. (1) Two teacher-researchers familiarised themselves with their own datasets through repeated readings, after which (2) they discussed their initial ideas, interests and possible connections between data items. The datasets were coded according to an initial coding framework informed by theory. Next, the data were collated by code to (3) search for potential themes, that is, cross-connections between codes. These potential themes were then (4) reviewed for adequate and coherent grounding in the data, which resulted in combining some initial codes. Then, (5) each theme was named and defined. The developed codes and final themes are available in Table 1. Finally, (6) narrative descriptions and data extracts were compiled, and the results are presented and discussed in the following section.

Table 1: final themes, codes and examples of data items. Numbers in parenthesis indicate the source of the example (Course ID: Running number code of the student.)

Final theme	Code	Examples of coded data items
Representations of yarn-craft learning	Yarn-craft techniques	"My granny taught me to knit and crochet when I was a little girl. I have pretty strong views on those techniques, and I have no need for any more learning" (1:2)
	Yarn-craft products	"I've knitted manyfold socks, but also baby cloths and, for instance, woollen trousers and sweaters." (2:3)
	Yarn-craft capabilities	"In addition to curiosity, to my strengths I count my capability to understand structures and patterns [...] I can scrutinize instructions critically and make changes, for instance, according to my own measures." (2: 2)
Learning goals	Learning task specific goals	"At times I didn't know anything about the technique. Then it felt a bit artificial to set goals for each task, you had to invent something. At times you nailed it, but not always." (1:13)
	Long-term learning aspirations	"I wanted to reach good basic level skills so that I can say that I can teach multimaterial craft, I can teach crochet and knitting for basic education pupils." (1:7)
	Skill development as a goal of its own	"I have years of experience of knitting, and as a keen knitter, I'm constantly interested in learning new, testing new structures and experimenting with various possibilities." (2:2)
Reflection on learning	Reflection	"I am satisfied with my learning. I learned everything I need, all of that. And in the future I can use that learning in my own studies and teaching." (1:4)
Students' satisfaction with the FL yarn-craft course	Course feedback: satisfied	"As a novice I could set lower goals and reach those goals. The skill slowly mounted, and I finally got some exercise work finalised ... it was like 'yes I can, this is a pretty cool thing, well done me." (1: 4)
	Course feedback: not satisfied	"How to continue [alone] at home? [...] When there was an error, one was immediately in knee-deep. Errors usually lowered motivation 'cause you didn't know what to do. Basics I could do, but with errors, I had my mouth wide open: what to do next, no clue at all." (1:8)

Results and discussion

The study results are presented and discussed in the same order as our research questions. Labelling of data excerpts is as follows: Course ID: Running number code of the student.

RQ1: Student craft teachers' learning on an FL yarn-craft course

In this study, we understood learning as acquiring new knowledge, skills or capabilities. However, the words "knowledge," "skill" or their synonyms were not frequently available in our data, even though the participants continuously wrote about and discussed their yarn-craft learning. Therefore, before entering into a deeper analysis of learning during the course, we needed to recognise how the participants explicated their yarn-craft learning.

Theme: Representations of yarn-craft learning

Codes: Yarn-craft techniques, products or capabilities

When describing their yarn-craft skills, most participants incessantly referred to techniques (crocheting, yarn dominance, braids, cables, etc.) and products (socks, pullovers, jewellery, rugs, hot pads, tops, etc.). The mentioned capabilities included teaching yarn-crafts, reading patterns (verbally described patterns, matrix and other diagrammatical types, patterns in foreign languages). Advanced crafters recognised manyfold capabilities (critical reading and modifying, designing and writing one's own patterns) that the novices did not mention. References to techniques and products were typically used when describing a (hypothetical) skillset necessary for craft teachers.

Theme: Learning goals

Participants primarily delineated their learning during the courses through self-set learning goals and self-reflections and, for Course 1 participants, by filling in a provided self-assessment form.

Code: Learning task specific goals

These goals were set per each learning task in consideration with teacher set criteria. Due to self-set goals, participants could direct their learning efforts in personally meaningful directions, even though the teachers had set certain minimum requirements for the tasks:

> "It was fun to think how I could combine these minimum requirements with a certain product I wanted to make. Like all the decreases and increases required for a crochet task." (1:2, Figure 1)

Figure 1: Syö vegee (in English: Eat Veg) Crochet exercise that (well) fulfilled the minimum technical requirements (five basic stitches, ten decreases and ten increases). (1:2)

The participants stated that it was difficult to set goals when the technique to be practised was totally new. For novices, the Course 1 teacher suggested examples of goals covering basic skills and structures. Several participants happily resorted to using these examples (Figure 2).

Figure 2: examples of a novice knitter's (1:16, on the left) and an advanced knitter's (1:6, on the right) solutions for a flat-knit learning task involving (a minimum of) ten decrease stitches and ten increase stitches.

However, advanced crafters also experienced difficulties in finding suitable goals: not too laborious, considering the timeframe, yet inspiring enough. As advanced crafters had varied skills and interests, suggesting projects that were inspiring and challenging enough for them required long conversations, high-level yarn-craft expertise and knowledge of current trends.

Some advanced learners set complicated goals, which required advanced SRL skills, such as perseverance and self-reflection, to develop creative solutions, often through trial and error:

> "I had heard of yarn dominance, but never got acquainted with it. I searched the internet [...] I also tried looping, as I tried to figure out how to put a logo in the mitten without long yarn floats and without needing to resort to a flat knit. I decided to design the required multi-coloured pattern. It was surprisingly demanding, and I had to try several patterns before I was satisfied. The number of stitches in the mitten needed to match the number of stitches in the pattern repeat. The thumb I knitted with a traditional style so as not to mess with the pattern. Another challenge came with the mitten top decreases, as I needed to plan for a diminishing number of stitches." (2:1, Figure 3)

Both novice and advanced yarn-crafters noted that they occasionally changed their learning goals after the contact lesson orientational discussion. The teacher's questions and suggestions opened new learning paths and opportunities, and at times, provided a sobering assessment of certain planned products – that is, orientational discussions incited self-reflection.

Figure 3: Designed and knitted multi-coloured mittens with yarn dominance and a looped logo on the back. (2:1)

Not all participants' goal-setting was solely informed by intention to learn yarn crafts. Some interviewed novices disclosed that they had deliberately chosen modest goals to avoid frustration and disappointment. Similarly, a couple of advanced crafters explained how they had intentionally set low goals in comparison with their skills because they saw themselves as "recovering perfectionists" in need of more moderate accomplishments. In these cases, self-regulation resulted in optimising the use of available resources rather than achieving maximum learning.

Code: Long-term learning aspirations

Participants' future teaching profession appeared as a strong guiding factor. The interviewed male novices had surrendered themselves to a future with multi-material crafts and a need to master yarn-crafts. Some sought a skill level with which they felt confident enough to continue learning independently. Both novices and advanced yarn-crafters shared a common opinion on "decent" levels of skills that a craft teacher should possess: basic knitting and crochet stitches. Yet, they also saw an elemental need for having wider and deeper skills than one teaches to one's pupils:

> "You need to be able to analyse pupils' work, give feedback and assess, to solve potential problems and to understand various needs of individual learners." (1:4)

Code: Skill development as a goal of its own

Even though advanced yarn-crafters already possessed skills far beyond the requirements of their future occupation, they often emphasised their orientation to continuously master new techniques. Learning new was seen valuable and interesting as such. Some challenged themselves to combine a certain structure or technique with a certain product in a novel way, or they utilised several techniques to create a structure. They produced studies of different sock heels, sock-knitting techniques, such as a magic loop, toe up, with intarsia, or a sock as a flat knit (Figure 4), or multi-coloured knitting with yarn dominance or a ladder-back technique.

Figure 4: On the left, various sock heels (1:7), and on the right, a sock as a flat knit, a sock with a basic heel and a sock with a strengthened heel and a cable on top (1:2).

One advanced yarn-crafter mentioned a "maximum increase in one's own yarn-craft skills" as a possible course goal. However, ambitiousness was not limited to advanced crafters, as a novice was pleased with the Course 1 teacher not setting an absolute cap on individual goals:

> "Adults should be allowed to pursue excessive goals." (1:3).

According to our experience (on coursework being very late), a word of caution is required here. Knowing your students well is the key. For some, more leeway and bold goals are necessary, while others prefer closer guidance and clear "warning signals".

Code: Reflection

Reflection in action and reflection on action (while doing vs. after doing, cf. Schön, 1983) are elemental for learning craft skills, as also recognised by Syrjäläinen (2003). Students, however, rarely used the word "reflect":

> "Handcrafts are such that you continuously have to evaluate your work. Already, when you do, you need to evaluate whether [the result] is fine. Is this developing in the right direction or does it look like you want it to look, and then afterwards, you evaluate again, which is good for your learning." (1:3)

For one Course 2 student, reflection was not limited to "in action" or "on action", but reached much farther back. She designed and knitted toe-up socks with cables and an hour-glass heel and claimed to have subdued her long-time sock-knitting aversion. The aversion had been caused by a frustrating experience at upper secondary craft lessons:

> "I wanted to knit something futuristically wonderful and inspiring from uncommon materials and techniques! The teacher didn't give in and, following Finnish traditions and with grinding teeth, I knitted striped woollen Pippi Longstocking-inspired socks. I was so proud, even if one of the socks had all too tight a leg. I wore them down. Despite my satisfaction with the socks, I felt a strong aversion to knitting socks." (2:4)

We interpret this as a signal that an open learning task, suitable constraints and the freedom to choose encourages creativity as well as deeper or wider learning – when the student has sufficient SRL skills.

While self-reflection is free of form, Course 1 participants were also required to conduct self-assessments according to set criteria. In the end-interviews, a minority of participants stated that they valued self-assessment. Some experienced self-assessment as difficult, and most Course 1 participants questioned the meaning of project-end self-assessments. Some of the criticisms reflected students' SRL skills:

> "I went to the contact lesson, did the things as well as I could. But I kind of forgot my goals. Partly because [the teacher] did not require us to do the assessment directly after finalising the exercise." (1:4)

Students' ownership of their learning processes did not cover the self-assessment phase. Some criticism focused on the Course 1 assessment form, which included eight criteria rather than an open space for verbal reflection:

> "With the form, I couldn't do as I wanted with the self-assessment. These criteria do not reflect what I feel from this project." (1:2)

Most participants saw self-assessment as a recall exercise. The form, forcing them to think in terms of criteria derived from Finnish NCCBE (used in elementary-level crafts in grades 7–9), did not allow participants to write freely whatever they saw as relevant. The future teachers' inability to utilise structured self-assessment forms is worrisome, especially considering that they will be required to use these very criteria in their future profession. Whether this was a motivational issue or reflected poor self-evaluation skills and a need for stronger support from the teacher was not clear from the data.

To summarise, most participants' long-term learning aspirations were clearly informed by their future occupation. Learning was directed in personally meaningful directions by the freedom to set one's own task-level learning goals. Yet, teacher support in goal-setting was welcomed when the content was unfamiliar. At times, the self-regulation of students' learning resulted in modest goals and learning – that is, optimising resource use rather than pursuing maximum learning. In general, students reported being content with their learning and reaching their learning goals. We interpret this as a signal that FL approaches encouraged creativity as well as deeper or wider learning when students had sufficient SRL skills. To support students learning, sustained teacher–student interaction was the key.

RQ2: Differences in novice and advanced yarn-crafters' satisfaction with the studied FL course

This summary relates to Course 1, as detailed feedback on Course 2 is not available for the purposes of this study.

Theme: Student satisfaction on the FL yarn-craft courses

Codes: Course feedback: satisfied AND Course feedback: not satisfied

Only one participant reported that he had previous FL experience, which he considered a good way to organise time and resources. In general, FL was seen as a flexible teaching strategy that allowed for the diversification of learning goals and tasks. Open-ended exercises and coursework, as well as choosing one's own learning goals and defining learning tasks was motivating:

> "When you have no skills, [setting your own goals] increases motivation because then all students have a possibility to succeed." (1:8)

Self-set goals and self-defined tasks framed exercises, so it was easier to grasp and monitor one's progress:

> "One had to think before [the contact lesson] what you wanted to do. Instead of just doing something, which is my natural way of doing things. It was good [that we had to set goals]." (1:7)

Some participants mentioned that flipping also provided a welcome change for them, both as an example of an inclusive teaching strategy and as a learning experience. A clear majority thought that successful flipping required students to have certain previous skills; totally new content was considered too challenging for flipping. Difficulties associated with a lack of a helping hand lowered motivation:

> "How to continue at home? [...] When there was an error, one was immediately in knee-deep. Errors usually lowered motivation 'cause you didn't know what to do. Basics I could do, but with errors, I had my mouth wide open: what to do next, no clue at all." (1:8)

This resonates with the findings of Han et al. (2022). In the above case, when the content was "too" unfamiliar, a usually persistent student felt helpless. This also suggests the need to discuss how to handle difficulties with students. Simple tricks, such as unravelling and re-doing, were not self-evident – or motivating – for everyone, even if they are an unavoidable part of becoming skilled in yarn crafts.

Videos were considered a medium that was familiar to them from their private lives and informal learning. Provided video tutorials were too simple for advanced yarn-crafters but beneficial for novices as reference material for assessing their own skill levels and finding suitable learning goals.

Several interviewees noted that not all students had prepared in an organised manner for contact lessons, which diminished the benefits for all, as teaching time had to be allocated to basics. A couple of novices distrusted their capability of benefitting from video tutorials and took the instructions "to watch" too literally. As illustrated by Syrjäläinen's (2003) model, all three phases of perceiving, interpretation and practising are necessary for skill learning, even at the elemental level. Students' help-seeking capabilities (and possibilities) outside class were different, but this behaviour also implies shortcomings in some students' SRL skills: they noticed that watching a video was not an adequate learning strategy for them, but they did not take the initiative to revise their strategy, instead waiting for the next contact lesson.

In general, there was no divide between advanced and novice yarn-crafters when it came to being content with the FL yarn-craft course. The dividing line is likely to be between students who are more and less capable of regulating their learning. However, our data do not fully allow for such a conclusion. For instance, comparisons cannot be made between Course 2's reflective essays and Course 1's end interviews. Reflective essays could be well structured and thought through, while interviews could invite to provide not always so carefully considered and comprehensive answers.

To summarise, even though some participants criticised certain aspects of the course, all participants were content with their overall FL experience.

Conclusions

FL is a pedagogical framework that has had a variety of implementations (Birgili et al., 2021) and research (Goedhart et al., 2019). However, the literature has been criticised for not treating the reasoning behind the related pedagogical decisions or describing the mitigation of student-related and contextual challenges (Koh et al., 2022, p.459). Moreover, flipping skill learning has not received much attention in the research literature. Unlike in many FL publications, our focus was not on producing videos, as the internet already has an ample collection of good quality yarn-craft videos suitable for autonomous learning. Neither did we have issues with digital resources, as modern technology, such as the virtual learning environment Moodle, fast broadband access and personal mobile terminals were already available for and familiar to our students. Instead, we focused on inclusivity, which is a growing concern for Finnish educators. Central to the inclusive viewpoint, FL implementation can allow each student to learn ways and at a pace that are suitable for them, as well as provide a range of options to demonstrate their learning and content expertise (Talbert, 2017). For teachers, this is not an easy approach. Butt (2014) argues that preparation for FL contact lessons takes less time, yet our understanding resonates more with Shih et al.'s (2019) results in that students' in-class interactions predict their experience of FL. Therefore, tailoring in-class activities for each particular student and student group, as well as designing purposeful interaction, requires careful pedagogical consideration, subject-matter expertise, flexibility to change plans in mid-air and deep reflection after each class. FL is also a learning journey for teachers.

FL implementations are rare in craft teacher education in these two universities, and participating students were not familiar with FL. FL challenges students' capacity to regulate their learning, which is also apparent in our results. Challenges occurred in all three SRL phases, in particular, with setting learning goals, changing learning strategies (even when students clearly realised that their chosen strategy was unsuitable) and in self-evaluations. Especially worrisome from the teacher educator viewpoint was Course 1 students' inability to utilise the given assessment criteria as a tool to enhance their understanding of the dimensions of yarn-craft expertise. This needs to be addressed in the future. Furthermore, according to our results, expertise in yarn crafts did not guarantee high SRL performance. Zimmerman (2013) argues that being skilled in SRL does not necessarily translate into high SRL performance, as one's performance level is dependent on motivation. Furthermore, all learners attempt to self-regulate their learning, yet better skills in analysing the task at hand result in more specific, proximal and challenging goals as well as the selection of more effective strategies (Zimmerman, 2013). This suggests that SRL performance is somewhat dependent on subject-matter expertise. To conclude, supporting SRL is an elemental part of FL implementation, irrespective of the students' yarn-craft expertise level. Simultaneously, longitudinal research on FL and SRL in craft teacher education is necessary to get a more profound understanding of above listed issues.

For this qualitative research, we chose to utilize data triangulation by acquiring multiple kinds of data, from two courses at different universities. Because of differing course structures, data collection could not be fully aligned. Similarly, setting up a control group was not possible within the structures in either of the universities. In this study, the student groups were small (maximum 16) compared with many

other FL studies. In addition, FL approach was only available in Course 2 for advanced learners; thus, the learning trajectories of advanced learners may be potentially overstated in the data. Although we do not aim to generalizability, we notice this as a possible limitation in the study design. We also recognize potential social desirability bias that may have affected study results, since the data rely on self-reported data and students may not always accurately report their learning; this may potentially lead to socially desired responses and introduce inaccuracies in the data.

According to our results, students saw individualising as a way of fostering meaningful learning experiences that have potential to promote study engagement, student autonomy, and a sense of success. Novice learners felt safe from excessively demanding and time-consuming tasks. Advanced learners could develop their higher-order yarn-craft skills, such as adapting and experimenting with techniques and creating novel ways to solve structural problems (e.g., sock heels), and simultaneously speculate about the good pedagogical practices needed in their future teaching career. It appeared that indigenous knowledge was not only learned to preserve and restore the traditions of craft making and teaching, as is historically the case, but also to help craft culture to develop to meet the challenges envisioned in future teaching and learning. Teacher education needs to provide students with strong enough teacher identities. Like the interviewed students, we believe that yarn craft will be one of the future winners in basic education crafts; thus, investing in providing a firm (technical and pedagogical) basis in yarn crafts for all our teacher students is essential.

The challenge of providing courses that account for students' differing entry-level skills and understanding indigenous knowledge of the practice is not limited to crafts. A similar challenge exists for several HE programmes, especially in domains that are not a direct continuation of compulsory high school or vocational education courses, such as practical subjects, arts, design, engineering and rare languages. Furthermore, the challenge is likely to spread to all educational levels. For societies such as Finland, its long-retained cultural homogeneity is starting to experience developments that are familiar in countries with a more diverse population, history and cultural tradition. When the number of pupils coming from different cultural backgrounds substantially increases, the need for inclusive pedagogical strategies increases even more. While seeing cultural diversity as an inviting source and an opportunity to scaffold the development of socialisation, growth and the reinvention of traditions, we believe that by utilising FL in CTE, we will prepare our students for encounters with the continuously diversifying pool of pupils.

Acknowledgements

We would like to thank the anonymous reviewers for their insightful comments and critiques. We also thank Ike Laine and Miika Laine for transcribing the interviews.

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