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PEDAGOGY

Teaching Readiness in Physical Education Teacher Education: Preservice Teachers' Content Development and Adaptations to Lesson Plans During School Placement

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Abstract

The purpose of this study was to examine (1) preservice teachers' (PSTs) content development in terms of task selection and specialized content knowledge (SCK) index; and (2) what adaptations to core practices PSTs make in lesson plans during school placement. Content development data were retrieved from 111 lesson plans of 11 PSTs. Data on adaptations to lesson plans following reflection-on-action with a supervisor were retrieved from 112 lesson plans of 10 PSTs. The data were coded by trained coders and analyzed descriptively. The PSTs planned an average of 4.51 tasks per lesson plan, and all had an SCK index below the 3.0 benchmark. On average, PSTs made 1.16 adaptations per lesson plan, with most being made to content development

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(46%) and management (26%). The PSTs demonstrated low SCK in the content they were teaching. The low number of adaptations might indicate PSTs' difficulties in adapting their teaching.

Introduction

Teachers' ability to adapt their teaching for students with different skill levels and prior knowledge (i.e., adaptive competence) is a crucial outcome of teacher education programs (Xie et al., 2021). Consider, for example, a teacher teaching a 1v1 badminton game. After observing a game with a higher and a lower-skilled student, the teacher decides to narrow the playing field for the lower-skilled student. The higher-skilled student needs to be more precise to score, and the lower-skilled student has less court to cover and is more successful in returning the shuttle. As a result, the game becomes more competitive and equitable. After the lesson, the teacher decides to add this task adaptation to the lesson plan for future classes. This example illustrates the teacher's ability to adapt a task to the student's skill level, a concept known as adaptive competence (Brühwiler & Blatchford, 2011; Xie et al., 2021).

Adaptive Competence

Teaching occurs in an active, constantly changing context that requires teachers to be adaptive (Xie et al., 2021). Adaptive competence is defined as teachers' "ability to adjust their planning and teaching to the individual learning processes of students" (Brühwiler & Blatchford, 2011, p.98). In physical education, teachers need to monitor students during often high-paced activities and make informed decisions regarding content and management to optimize their learning. Adaptive competence views teaching as a decision-making process rather than a prescriptive activity (Ward et al., 2018).

Research on adaptive competence in physical education has investigated PSTs' adaptations to core practices in lesson plans and during their teaching (Bosmans et al., 2024; Cho et al., 2023, 2024; Dehandschutter et al., 2024; Xie et al., 2020; 2021). Core practices are the central teaching tasks that teachers need to teach effectively (Forzani, 2014). In teacher education programs, PSTs focus on the application of core practices within specific content and contexts, rather than viewing learning theory and pedagogy as discrete events

(Forzani, 2014; McDonald et al., 2013). Ward (2021) defined and validated a set of sixteen core practices for physical education, including developing rules and routines, presenting content in progressive steps, and using accurate demonstrations to present the content to students. Core practices are highly contextual, and beginning teachers need to learn to apply these in varying circumstances and with different learners (Ward et al., 2020). In other words, core practices are transferable skills that enable PSTs to learn from and about their teaching, thanks to the multiple opportunities for practicing analysis and decision-making during lessons.

Deliberate Practice

The improvement of teachers' ability to adapt their core practices requires a deliberate effort. Several researchers have proposed different pedagogies to develop adaptive competence, such as deliberate practice and reflection. Deliberate practice means that during the planning or teaching of lessons, teachers focus intentionally (i.e., deliberately) on the improvement of one or more core practices (Xie et al., 2021). The term implicates intentional efforts to improve performance (Ericsson et al., 1993) and is characterized by goal setting (Ward et al., 2018). Several teaching pedagogies, like teaching rehearsals, can be used to facilitate deliberate practice. In teaching rehearsals, such as peer teaching in methods classes, PSTs can focus on the nuances of teaching, with a deliberate emphasis on core practices. A study of Cho et al. (2023) conducted during an introductory methods class reported on PSTs' adaptations to core practices in three lesson plans. PSTs had multiple opportunities to make adaptations to each lesson plan, and data reported a median number of adaptations of 39 (lesson plan 1), 49 (lesson plan 2), and 38 (lesson plan three). Most adaptations were made to the core practice of "providing clear instructions" and "establishing rules and routines." Similar results were found in two studies by Xie et al. (2020; 2021). In a first study conducted during peer teaching (Xie et al., 2020), five PSTs had a total of five opportunities to make adaptations to three lesson plans. Out of a total of 620 adaptations, most adaptations were made to 'establishing rules and routines' (n=150) and 'providing precise instructions' (n=115), after 'coordinating and adjusting instruction' (n=234). In a follow-up study (Xie et al., 2021), adaptations to core practices were examined in a virtually taught introductory methods

class. Nine PSTs made an average of 788 edits during seven weeks, with 16 edits to two lesson plans and an additional edit to a novel lesson. Most edits were found in the core practice of "providing precise instruction" (mean = 421.2), followed by "establishing rules and routines" (mean = 141.8).

Reflection

Schön (1987) discriminated between two types of reflection: reflection-in-action and reflection-on-action. When connecting a teacher's reflection with their actual, practical pedagogical action, teachers can adapt their teaching either during or after the teaching process. The former is the result of reflection-in-action, and the latter is the result of reflection-on-action (Schön, 1987). For example, during a lesson (reflection-in-action), the teacher notices that one of the students is not successfully performing the basketball's pass-and-go move. She steps in and instructs the student to feint a passing movement and change speed after passing (adaptation to the task, i.e., content development). As for reflection-on-action, a teacher may only realize that she could have solved a lesson problem after class, when she looks back at the lesson plan and reflects on what she could have done better or what she would do better next time. The teacher may also sense that different feedback should be provided (active supervision and monitoring) and that it is best to refocus the task goals on setting the forearm position straight (goals and assessment).

In considering reflection-on-action, a teacher's decisions during post-lesson reflection and planning may reflect the application of knowledge regarding how a teacher will teach (Xie et al., 2021) in the next time they may face a similar situation. This level of applied reflection demonstrates a certain level of pedagogical ability, empowering teachers to anticipate future teaching challenges and draw on prior reflections when planning the next lesson. In physical education, reflection on action has been implemented to facilitate PSTs' development of adaptive competence. Bosmans et al. (2024) examined the effect of guided reflection for adapting core practices in lesson plans during a methods class. PSTs who received a personal feedback meeting with video analysis of their teaching and probing questions made more adaptations than PSTs who only received class-wide feedback or PSTs who only observed their peers teach

during the methods class. Cho et al. (2023) used the practice-based pedagogy cycle, a six-step process that includes reflection, to develop the adaptive competence of PSTs. The reflection helped PSTs to think about how to improve their teaching for the next time. To date, there is one study that examined adaptive competence during school placement (Dehandschutter et al., 2024). Two PSTs adapted two lesson plans during three iterations and were supported by feedback, guided reflection on action, and repeated teaching. Results indicated that the PSTs made substantive changes in their lesson plans and demonstrated growing competence in their teaching.

Content Knowledge

The concept of adaptation relates to Shulman's (1987) definition of pedagogical content knowledge (PCK). Shulman (1987) considered PCK as "an understanding of how particular topics, problems, or issues are organized, presented, and *adapted* to the diverse interests and abilities of learners, and presented for instruction" (p.8). Consequently, teachers' adaptations of planning and teaching are an element of PCK.

Teachers' PCK is largely influenced by their content knowledge (CK). Ward (2009) defined knowledge about rules, techniques, and tactics needed to perform a specific task (e.g., a badminton clear) as Common Content Knowledge (CCK). The knowledge to teach an activity (e.g., knowing the different task progressions to teach a badminton clear), or to teach CCK, to students is operationalized as Specialized Content Knowledge (SCK). In PETE, SCK can be subcategorized into instructional tasks (e.g., different task progressions), frequently made errors and how to correct them, and how the content is presented to students (e.g., descriptions, demonstrations, and metaphors). It consists of knowledge about student errors, knowing how to present a task, and how to adapt the task for learners with different skill levels (Ward et al., 2020).

Content Development

The sequencing of tasks to achieve an instructional outcome is referred to as content development (Ward et al., 2020). In her seminal work, Rink (1979) defined four main task types to teach toward an instructional outcome progressively. An informing task is an initial task in progressing a skill or tactic. Extending tasks increases

or decreases the complexity or difficulty relative to a previous task. Refining tasks focus on performance quality, such as improving the technique. In an applied task, students need to apply their CCK in a particular context, such as a game.

A large body of evidence shows that PSTs enter PETE programs with limited knowledge of the content they need to teach (Tsuda et al, 2019). Additionally, they often acquire only a small portion of that knowledge during their training (Iserbyt & Coolkens, 2020; Tsuda et al., 2019; Ward et al., 2020). This is a critical issue since teachers will struggle to teach content that they don't know. To measure the depth of the content development, Ward et al. (2017) created and validated an SCK index score. The resulting score reflects the teacher's depth of SCK. The SCK index score places the informing task as a denominator and all other instructional tasks as numerators, where a score of 3.0 can be identified as a benchmark for strong SCK. Reviewing work regarding SCK must be done carefully because effectiveness can be influenced by the method used to measure it: what SCK the teachers used versus what SCK the teachers planned, which may be less (Kim & Ward, 2021).

Purpose and Research Questions

Several studies have examined the content development and adaptive competence of PSTs during teacher training and methods classes. This study will investigate both variables in the context of a school placement within a PETE program in Northern Portugal. More specifically, this study will investigate how PSTs make adaptations to core practices following their teaching without specific support or training, which contrasts with previous research (e.g., Bosmans et al., 2024; Cho et al., 2023; Xie et al., 2020, 2021). The following research questions were defined: (1) What is the PSTs' content development of PSTs in terms of task selection and SCK index? and (2) What adaptations to core practices do PSTs make in lesson plans? We hypothesized that (1) PSTs' task selection will mainly consist of informing tasks, which would result in SCK index scores lower than the 3.0 benchmark; and (2) PSTs make more adaptations to management and content development compared to the other core practices.

Methods

Participants and Setting

Participants were 16 PSTs (11 males and five females; mean age = 23±1.9 years) enrolled in the second year of a two-year PETE Master's program at a Northern Portuguese Faculty of Sport. The PSTs were placed in nine secondary schools for school placement training and supervised by nine cooperating teachers who had ±30 years of experience in teaching and ±20 years of experience as cooperating teachers. Data were collected during PSTs' school placement. In total, this study considered 12 basketball and volleyball units taught by PSTs during their school placement, with a minimum of eight lessons per unit.

In the first course year, the PSTs completed coursework on six theoretical course units (e.g., Curriculum Development in PE, Teaching Professionalism, Educational Psychology, Research in Education, School Culture and Organization; General Teaching Methods in a total of 240 hours) and 12 practical-based units including team sport teaching methods (Volleyball, Basketball, Football, Handball), individual sport teaching methods (Swimming, Athletics, Gymnastics, Badminton, Dance, Martial Arts) and Physical Activity-based teaching methods (Adapted Sport, Fitness) totaling 360 hours. For both basketball and volleyball (the school placement units taught by PSTs in the current study), PSTs received 30 hours of pre-school placement training (two hours x 15 sessions per sport). In each teaching methods unit, the PSTs learned a particular content (e.g., badminton, swimming) associated with different pedagogical models (direct instruction, Sport Education, Games-based approaches). In most units, the PSTs engaged in group peer-teaching practice and teaching sessions with children from the fifth grade. In the professional school placement of the second year of the course, PSTs work 14 hours a week for a full academic year (i.e., 34 weeks, totaling approximately 470 contact hours). The Ethical Committee from the fourth author's university granted ethical approval for this study (CEFADE12-2023).

School Placement

During school placement, each PST was responsible for teaching two units each school term (two team sports—e.g., basketball, volleyball; one individual sport—athletics or gymnastics; and one outdoor adventurous activities unit—orienteering) to one fixed secondary class across the entire academic year. The university supervisor's (±11 years of supervision experience) support included three annual field observations per PST and post-lesson reflective work sessions together with the cooperating teachers.

During their daily fieldwork, PSTs received proximal support from their respective cooperating teacher, who observed all lessons and met weekly with PSTs to discuss and address their ongoing teaching challenges. This support included suggestions for appropriate tasks, management, instruction strategies (e.g., task presentation), and learning monitoring (e.g., error detection feedback). In addition, the university supervisor and the nine cooperating teachers held weekly meetings to align the mentoring procedures applied to PSTs. In school placement, accommodation facilities varied per school and could not be standardized.

Dependent Variables

Although 16 PSTs participated in this study, not all participants provided cumulative data for the two dependent variables (content development and adaptations). A total of nine volleyball units and six basketball units were considered in content development, and eight volleyball units and six basketball units in the adaptations made to lesson plans.

Content Development

Data from 11 PSTs (four females, seven males) were included. A total of 111 lesson plans were coded and analyzed, of which 32 represented basketball and 70 referred to volleyball. Content development underwent the following coding protocol: (1) PSTs counted the number of tasks following an informing one in their lesson plans; (2) during post-lesson reflections, the tasks were coded into the seven groups defined in Table 1 based on the work of Rink (2020). In addition, to accommodate game-based approaches, the task types defined by Rink (2020) were extended to include refining-applying, extending-applying, and applying-non-game tasks (Ward et al.,

Table 1
Definition of Content Development Variables

Task type	Definition + example
Informing task (I)	The initial task in the progression of a skill and which cannot be classified under the other categories. For example, "We start with a 1v1 badminton game on half court, but you can't score in 'the death zone' in front of the service line."
Extending task (E)	A task that increases the level of difficulty of a previous task by adding or deleting elements (e.g., adding the lob service) or adding more variety (e.g., touch a sideline after every stroke).
Extending-Applying task (EA)	An extending task occurring in context of a game-like environment where the purpose is to apply the task in a game. For example, "From now on you can only score with a clear."
Refining task (R)	A task that requires a specific focus on the quality of performance such as technique or tactical performance. For example, "Shift your bodyweight from the rear foot to the front foot when hitting the shuttle."
Refining Applying tasks (RA)	A refining task occurring in context of a game-like environment where the purpose is to apply the task in a game. For example, "Try to find the open spaces in your opponent's court."
Applying task-game (AG)	A task that uses the content of the lesson in a game. For which the particular focus is not specified. For example, "We play a 1v1 half court badminton game."
Applying non-game task (AN)	A task that centers on assessment of form or on how to use the movement, rather than just how to do the movement. For example, "How many sequences of clear – clear – drop can you and your partner make within 1 minute?"

2017). Applying-refining and applying-extending tasks are types of tasks that occur in a game-based situation, refining and extending skills. Applying non-game tasks are tasks that serve as assessments or center around how to use the movement; (3) appropriateness was checked first by their peer PST (i.e., a PST that was at the same school)followed by the cooperating teacher and by the university supervisor; (4) the coded data were organized into one single coding file; (5) SCK-indices were calculated (all but informing tasks / informing tasks); (6) proportions of task types were used to examine the task selection.

Lesson Plan Adaptations

A total of 112 lesson plans were coded and analyzed (basketball = 34 and volleyball = 68). Twenty-three of those lesson plans were delivered by a dyad of PSTs. Eighty-nine were individual assignments.

Two students were excluded due to incomplete data regarding their adaptations. The total data were collected from 10 PSTs (two females and eight males).

The adaptations that PSTs made to core practices were written on lesson plans and then entered datasheets. The coding protocol consisted of three steps: (1) translation into the coder's native language (Dutch); (2) verifying whether it was an adaptation (e.g., oftentimes PSTS would write comments like "This did not work well," which was not coded as an adaptation); (3) Indicating to what core practice the adaptation was referred to. The six core practices are defined in Table 2.

Data Collection and Reliability

The PSTs' supervisor collected the lesson plans and the results of their assignments to make a reflection-on-action following each lesson during their school placement. All these documents containing data were uploaded to an online learning management system. The data were then downloaded and compiled into a single Excel file for coding.

Table 2

Core Practices and Examples

Core practice	Example from the study
1. Goals and assessments (GA)	Formative evaluation to assess and re-evaluate the process and future goals in a 3v3 basketball and volleyball game.
2. Establishing rules and routines (RR)	Each session will be ended with putting away materials and a check for understanding.
3. Management (MA)	Assemble the students with the purpose of improving efficiency of task presentation.
4. Content development (CD)	Underhand throw instead of underhand service to optimize playing the game.
5. Task presentation (TP)	Select skilled students to demonstrate the task and rotation system.
6. Active supervision and monitoring (AM)	Observe the criteria of the task and (only) give feedback accordingly.

For reliability, coding occurred on four different levels. First, students and their peers coded as part of their coursework. The supervisor checked completeness and provided feedback. Subsequently, the authors established goals and aligned their understanding of the different criteria for coding during a first meeting. Then, one of the authors began coding and highlighted the difficulties and uncertainties. Upon completion, the coding results were discussed in a follow-up meeting to resolve any disagreements. Additionally, >35% (n=158 adaptations) of the data was checked by a trained coder, obtaining an intercoder reliability of 90.4% ([agreements/(agreements + disagreements)] * 100).

Data Analysis

The data analysis was conducted in an Excel spreadsheet. After coding task types and adaptations in lesson plans, descriptive statistics were calculated in Microsoft Excel. Average tasks per lesson, SCK depth, and proportions of task types were described for the participants included in the first research question. Absolute numbers of the different adaptations made to core practices were described for the participants included in the second research question.

Results

Content Development

A total of 111 lesson plans from 11 PSTs were coded and analyzed. Results showed an average of 4.51 tasks per lesson plan (range, 3.78–6.0) and a mean SCK index of 2.14 (range, 1.62–2.93) for the 11 PSTs (see Table 3). None of the PSTs reached the 3.0 SCK benchmark. Informing tasks represented on average 34% of tasks in PSTs content development, followed by extending tasks (22%) and applying-game tasks (20%). Refining and refining-applying tasks represented 6% and 5% of tasks, respectively. Extending and applying tasks represented 12%, while applying non-game tasks represented 11%.

Adaptations to Lesson Plans

Adaptations to lesson plans were analyzed to examine the adaptive competence of the PSTs. The PSTs made 130 adaptations in 112 lesson plans, averaging 1.16 adaptations (range: 0.38–1.78) per lesson plan (see Table 4). Adaptations to content development ac-

Table 3
Overview of Tasks (n=504), Average Tasks Per Lesson Plan, Specialized Content Knowledge (SCK) Index, and Task Types for 11 Preservice Teachers (PSTs) across 111 Lesson Plans

PST	Lessons	Total Tasks	Average tasks per Lesson Plan	SCK index	I (%)	E (%)	EA (%)	R (%)	RA (%)	AG (%)	AN (%)
1	8	35	4.38	2.02	37	11	20	9	3	14	6
2	8	35	4.38	2.75	29	17	17	6	9	14	9
3	9	37	4.11	1.87	35	19	8	5	8	24	0
4	9	34	3.78	1.65	38	15	9	6	12	21	0
5	10	41	4.10	2.35	29	29	5	10	0	20	7
6	10	47	4.70	1.62	36	23	9	9	0	23	0
7	10	55	5.50	2.93	29	47	7	0	0	16	0
8	11	44	4.00	1.66	41	16	5	2	5	25	7
9	12	72	6.00	2.13	35	22	14	7	0	22	0
10	12	47	3.92	2.63	28	13	17	0	4	9	30
11	12	57	4.75	1.89	37	21	18	0	0	25	0
Average	10	46	4.51	2.14	34	22	12	6	5	20	11

counted for 36% of all adaptations, followed by 28% for management. These two core practices represented 64% of all adaptations. The least adaptations were made to the core practices of developing goals and assessments (8%) and establishing rules and routines (9%).

Discussion

This study aimed to answer the following research questions: (1) What is the PSTs' content development in terms of task selection and their SCK index? and (2) What adaptations to core practices do PSTs make in lesson plans? We hypothesized that (1) PSTs' task selection will mainly consist of informing tasks, which would result in SCK index scores lower than the 3.0 benchmark; and (2) PSTs make more adaptations to management and content development compared to the other core practices.

Content Development

The PSTs in this study did not achieve the 3.0 benchmark of SCK in their lesson plans. This suggests that PSTs lacked sufficient knowledge about the content they were teaching. Although highly undesirable, various authors from different countries have reached the same conclusion. In their study with PSTs, Iserbyt and Coolkens (2020)

Table 4
Overview of Adaptations (n=130) to Core Practices for 10 Preservice Teachers (PSTs) across 112 Lesson Plans

PST	Lessons	Total Adaptations	Adaptations per Lesson Plan	GA	RR	MA	CD	TP	AM
1	14	22	1.57	1	2	8	10	0	1
2	14	25	1.79	2	1	7	8	4	3
3	16	23	1.44	4	3	6	4	4	2
4	4	4	1.00	0	0	4	0	0	0
5	10	11	1.10	1	1	4	3	0	2
6	14	16	1.14	0	0	2	11	1	2
7	6	6	1	0	0	2	1	2	1
8	15	14	0.93	1	0	1	7	3	2
9	13	5	0.38	0	1	1	1	0	2
10	6	4	0.66	0	0	1	2	1	0
Total (%)	112	130	1.16	9 (7%)	8 (6%)	36 (28%)	47 (36%)	15 12%)	15 (12%)

reported median SCK indexes of 1.67 and 1.15 in parkour and basketball, respectively. These PSTs had just received a methods class on how to teach both content domains in middle and high school. In this study, informing tasks represented the largest proportion of tasks planned by PSTs, which confirms findings from other research (Ward et al., 2017) and is a mathematical antecedent for lower SCK index scores. Ayvazo and Ward (2011) and, more recently, Ward et al. (2017) argued that extending tasks are more often used by more knowledgeable and expert teachers. The results of this study showed that PSTs had a planned proportion of 22% extending tasks. Extending and applying tasks represented only 12% of the total tasks. Because the content domains of volleyball and basketball were taught using a games-based approach in the teacher education program, one would expect proportionally more extending-applying tasks (i.e., extending tasks in a game-based setting) compared to extending tasks. It seems that the content development of the PSTs during their school placement does not reflect this approach, as previously argued by Iserbyt and Coolkens (2020). In conclusion, PSTs showed preferences in informing, extending, and applying game tasks.

The finding above can be considered in light of the host university's curricular choices in this study. Namely, and as it relates to the

second finding regarding the first research question, PSTs taught a minimum of eight units in each school on the same topic. This policy choice of rather long units lends itself to a lot of extending(-applying) and refining(-applying) tasks. These refining(-applying) tasks were not planned by PSTs accordingly, which is an indicator of limited SCK. A possible explanation could be the absence of knowledge of student errors. Previous research has suggested providing PSTs with CK workshops to enhance content development (Kim et al., 2018).

Adaptations in Lesson Plans

Relative to the second research question, the results indicated that PSTs in this study made substantially fewer adaptations to lesson plans compared to previous work (Bosmans et al., 2024; Cho et al., 2023; Dehandschutter et al., 2024; Xie et al., 2021). Earlier studies in adaptive competence implemented intensive interventions to assist PSTs in developing adaptive competence. Reflection-on-action in those studies was supported through personal feedback meetings (Bosmans et al., 2024) or the practice-based pedagogy cycle (Cho et al., 2023). In contrast, this study was conducted during school placement with limited support for developing adaptive competence, which, together with PSTs' low SCK, possibly led to substantially fewer adaptations compared to other work. Dehandschutter et al. (2024) demonstrated that substantive adaptations in lesson plans can be made during school placements. However, their support in PSTs' adaptive competence was quite intensive, consisting of three iterations of each lesson plan combined with daily lesson observation and feedback meetings, which limits the feasibility of this approach to a regular-sized PETE program.

Additionally, in methods classes PSTs are supported by experienced supervisors who prompt PSTs and guide them towards the development of adaptive competence. The supervision during school placement by cooperative teachers may differ from that by PETE faculty, which could also explain the few adaptations observed in this study. To date, the impact of cooperating teachers' supervision and feedback on the development of adaptive competence has not been investigated. However, it may be of prime importance, as they usually spend a considerable amount of time with PSTs. The design of this study—adaptations were made to the lesson plans—could

also contribute to the relatively low frequency of adaptations, as the same PST may become more adaptive through practice, reflection-in-action, or repeated teaching, which is not reflected in these results. Being able to reflect in action is another important component of adaptive competence.

Most adaptations in this study were made to the core practice of content development (*n*=47; 36%) and management (*n*=36; 28%). This contrasts with other studies, where most adaptations referred to rules and routines or different aspects of task presentations (Xie et al., 2020, 2021; Cho et al., 2023). While in methods classes, PSTs often work from incomplete lesson plans provided by PETE faculty; however, during school placements, PSTs usually write lesson plans from scratch. This might affect the number of adaptations PSTs make in lesson plans. In contrast, this study found that management was an often-adapted core practice. Xie et al. (2020, 2021) and Cho et al. (2023) also found that establishing rules and routines was often adapted. Both core practices may be interrelated because they are primarily used for fluent transitions and other organizational activities. Perhaps this might reflect a different focus of the program. Additionally, it has been argued that during school placements, PSTs tend to adopt the rules and routines of the cooperating teacher, which explains why little adaptation to this core practice occurs (Dehandschutter et al., 2024).

Together with management, content development accounted for 64% of the adaptations made to lesson plans in this study. The number of adaptations to these core practices reflect the findings of limited SCK in the PSTs. Whenever a PST had to make a lot of adaptations related to content development, it often implied uncertainties regarding the content taught. However, this finding cannot be generalized to every PST. Different initial levels of content knowledge guided PSTs towards different content taught and adaptations made. It underlines the importance of strong (S)CK to develop adaptive competence in both preservice and in-service physical education teachers (Kim & Ward, 2021). The relatively low frequency of adaptations made towards task presentation and active supervision could also be explained by limited content knowledge. It implies not knowing how to explain a task or how to correct errors.

Limitations and Strengths

This study has a few limitations. First, field-based research in teacher education settings often involves a limited sample size. Also, there is no control or comparison group. This makes it impossible to assess the cooperating teacher's or co-teacher's role in determining the development of adaptive competence and selecting appropriate tasks. The content knowledge of the individual PSTs was not evaluated before this study. This could have given insights into the decision-making process of less knowledgeable or experienced PSTs. Finally, we have no idea about the effect of the adaptations on students' performance and learning, nor do we know why PSTs made certain adaptations. Both domains are certainly areas for future research.

The study reports representative data of an intact PETE program as it is currently organized, which is a strength of this study. As discussed, the study could contribute to an evidence-based development of adaptive competence through core practices. Some of the descriptive results provided here could potentially inform future (quasi-)experimental designs. Additionally, the role of possessing or gaining more content knowledge regarding the development of adaptive competence should be explored further in future research. Especially now because of the possibility to measure the evidence-based distinction between PCK, SCK and CCK. This could be a significant intervention for in-service teachers during a professional development workshop or content classes.

Conclusion

This study shows that during school placement, the PSTs in this study had an SCK index below 3.0. Additionally, the low number of adaptations made in lesson plans reflects difficulties in adapting their content and teaching. A key contrast with previous studies is the absence of expert support and accountability. Future work should include CK workshops to improve PSTs' content development and support in developing adaptive teaching to improve PSTs' adaptive.

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