Geography curriculum fidelity in map-skills development: Examining teachers' personal concepts, lesson objectives, and observed lessons

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ABSTRACT   Quality education requires teachers to approach the curriculum systematically. Systematicity in education can be viewed from different perspectives. One of these is fidelity across the different levels of the curriculum: planned, implemented, and acquired. The basic premise is that what has been planned should be implemented and mastered. Therefore, transitions between different levels of the curriculum should not trigger unintentional changes in objectives, contents, and so forth. Thus, this study aims to examine curriculum fidelity and systematicity, specifically, the links between the planned and the implemented curriculum, in one specific segment of geography education: map skills. To this end, a combination of observations and recordings of model lessons and interviews was used to research 20 lower secondary school teachers and their lessons. The results suggest little systematicity in the development of map skills, that is, only weak fidelity between the planned and implemented curriculum. Particularly, a fundamental problem was observed in setting the learning objectives of a concrete lesson.

KEY WORDS   curriculum fidelity – map skills – curriculum recontextualization – personal conception of teaching – lesson planning – geography lesson – geography education

1. Introduction

General education in Czechia has followed a two-tier curriculum for 16 years. The state curriculum, the so-called Framework Educational Programme (hereinafter FEP), normatively sets the framework for individual types of schools and is the basis for the development of the School Educational Programmes (hereinafter SEP). Each school thus can adapt the curriculum to its own vision and local conditions within the relatively general rules prescribed by the state.

As unique individuals, the ways teachers implement these curriculum requirements differ (Priestley et al. 2012; Mullis et al. 2003; Swann, Brown 1997). Consequently, differences arise between the planned (projected or intended) curriculum at the national level, the curriculum implemented in individual schools or classes, and the curriculum achieved by students (Mullis, Martin 2017; Knight 2001). During the multi-level process of educational content transformation (recontextualisation), there should not be unintentional changes in the declared main objectives of education or their only marginal fulfilment.

This dynamic represents the fidelity of curriculum implementation (Dusenbury et al. 2003; Dane, Schneider 1998; Carroll et al. 2007; Remillard 2005, Ruiz-Primo 2006), i.e., the extent to which educational interventions are implemented in accordance with the original intention or plan (Stará 2011). Dane and Schneider (1998) defined five aspects of fidelity: curriculum: adherence, exposure, differentiation, quality of curriculum delivery, and participant responsiveness. Carroll et al. (2007) expanded upon this list to include curriculum complexity and strategies supporting implementation. The fidelity of curriculum implementation is then often aligned with the systematicity and effectiveness of education (Stará 2011). The fidelity of the intended and implemented curriculum is crucial. Teaching that lacks it can be highly ineffective and disjointed and usually leads only to superficial knowledge acquisition or skill development (Sleep 2012; Seidel, Rimmele, Prenzel 2005). Moreover, the importance of curriculum fidelity is emphasised by Ausubel's theory of meaningful learning (Ausubel 1968) and Whittrock's theory of generative learning (Whittrock 1991).

We do not know much about the curriculum fidelity in Czech geography education from this perspective. It can be assumed that the relatively broad and general curricular frameworks (ČŠI 2012) allow teachers to implement their personal conception of teaching, which reflects their personality, professional qualities, and experiences (Rashid, Jaidin 2014; Kosíková 2011). Such professional knowledge, personal qualities, value priorities and experiences of each teacher influence each teacher's implicit (tacit) ideas and consequently all their actions, including formulating the conception of geography education at a particular grade, planning and implementing individual lessons, assessing students, and reflecting on lessons. The more general and less prescriptive the curricular requirements placed

on students' performance in the FEP or SEP are, the more emphasis is placed on the teachers' intended curriculum in the form of their personal conception of teaching.

This study does not investigate the fidelity of geography curriculum in its entirety but focuses on one specific aspect of geographical education: map skills. A certain level of map skills is vital for geographical thinking and provides young people with new ways of thinking about the world and, at the same time, with powerful ways of analysis, explanation, and understanding (Maude 2016, Biddulph et al. 2020). Therefore, map skills can be considered an example of powerful geographical knowledge that should be developed in geography lessons. However, even in the case of map skills, the FEP's curricular requirements are not very guiding (Hanus, Marada 2013). Teachers predominantly focus on the development of cognitively low-demanding skills (Hanus, Havelková 2019). However, this does not mean that they do not meet the requirements of the curriculum. In fact, regarding map work, the Czech curriculum does not emphasise the need to develop more cognitively demanding skills, which are crucial to the development of geographic literacy, including disciplinary thinking (Řezníčková 2019). It can therefore be assumed that the requirements for map work stated in the curriculum documents will be fulfilled, as these requirements are predominantly map reading, or basic analysis in the form of searching for similarities and differences between phenomena in the map (Hanus, Marada 2013; Mrázková 2013). The actual trends in geography education demonstrate that, given the need to develop more cognitively demanding geographical thinking skills (Bednarz, Heffron, Huynh 2013), these requirements are insufficient. Relatedly, if teachers develop more cognitively demanding map skills in their students than those in the FEP, their personal conception of teaching can be considered the intended curriculum. Then the teacher's personal conception of teaching assumes part of the role of the national curriculum and thus constitutes the starting point (in terms of the planned/intended curriculum) for the choice of objectives and methods of implementation of the specific teaching (i.e., the implemented curriculum).

The intention of this study was therefore to understand how this process of curriculum development and implementation takes place in terms of curriculum implementation fidelity, particularly the aspects of curriculum adherence, exposure, complexity, and quality of delivery. The main objective was to examine to what extent the process of planning and implementing the curriculum is systematic, i.e., whether the same mapping skills occur in the teacher's personal conception, in the stated lesson objectives, and in the actual teaching. Therefore, we focused on the following four research questions:

– What is the teacher's personal conception of map skills development?
– What learning objectives do teachers formulate when developing map skills?
– Which map skills do teachers really develop in their teaching?

– Do the same skills occur in personal conceptions of map skills development, objectives, and actual teaching, i.e., are students' map skills developed systematically?

By addressing these questions, we can determine whether teachers are systematically developing map skills in their students, i.e., implementing the ideas of the intended curriculum with a clear and thoughtful intention.

2. From a teacher's personal approach to the lesson

Catling (2004), who discussed a personal conception to geography teaching, and Svobodová, Spurná, and Knecht (2020), who addressed the topic in the Czech environment, operated with seven conceptions of geography and geography education. The ideal would be to alternate between the different concepts so that students learn about a wide range of approaches to geography (Svobodová, Spurná, Knecht 2020). However, the question remains whether teachers can change their conceptions, as it appears that personal conceptions of teaching exhibit a high degree of inertia and are therefore largely consistent (Chan, Elliott, 2004; Mareš 1990/1991).

Czech teachers' personal perceptions of geography and map skills were investigated by Hanus and Havelková (2019), who identified three types of teachers. Teacher navigators emphasise practical orientation in the real environment or observation of the landscape as part of their geographical skills. In terms of map skills, these teachers prefer the use of scale, coordinates, or practical navigation in the landscape. Problem-oriented teachers use geography to develop problem-solving skills and geographical thinking. This approach to geography skills is consistent with the ideas of many international authors (e.g. Bednarz, Heffron, Huynh 2013). Its potential for the comprehensive development of map skills is great, as it leads to the use of maps as a source of information for solving problems and answering geographical questions. Resource-oriented teachers, the third type, place the greatest emphasis of all three types on map work. Some even see map work as the main goal of geography education. Their preferred skills include working with a coordinate grid or identifying similarities and differences in the spatial distribution of phenomena and processes. They typically work with various types of maps and combine them with other sources of information (Hanus, Havelková 2019; Hanus et al. 2020).

Extant studies have examined how teachers teach and why they teach the way they do. However, they often work exclusively with mediated reality. They identify what is important to teachers in their teaching, but they do not investigate whether they implement these preferences in their teaching. Notably, Bednarz, Acheson, and Bednarz (2006) found that teachers declare significantly higher

cognitive-level objectives than they then actually implement, a discrepancy also found by Bol and Strage (1996) and Verhoeven and Verloop (2002).

If we want to determine the factors that condition the way teachers teach, we also need to focus more on their curriculum-planning process (Mitchell et al. 2022), as this is the second-most time-consuming task for a teacher (OECD 2019; OECD 2014; Budd, Earley 2004). Consistent planning helps to prevent potential problems and is essentially the only route to systematic learning in pursuing educational objectives (Saad, Chung, Dawson 2014). The planning process itself is highly individual. The teacher must take into account many factors in the process (Saad, Chung, Dawson 2014), and the composition and importance of these factors may change as the teacher gains professional experience. For novice teachers, plans tend to be short term, while more experienced teachers pursue more long-term visions (John 2006).

Setting learning objectives is a key part of curriculum-planning. It deals with their relevance, hierarchy, continuity, and acquisition in the context of the given conditions. It is also important to consider to whom the objectives are addressed (students or teachers), interdisciplinary overlaps, etc. The thoughtful formulation of learning objectives and their subsequent fulfilment is a sign of quality teaching (ČŠI 2017).

3. Development of map skills

Research on critical facets of geography curriculum in lower secondary schools in Czechia has shown that maps are the second-most critical issue (Pluháčková et al. 2019). There may be several reasons for this, e.g., the inclusion of the relatively abstract thematic unit of cartography as early as grade 6, when students do not yet have the necessary mathematical knowledge; working with maps is demanding on imagination and spatial perception; and the high level of geography teachers without specialisation in geography education who do not have sufficient knowledge or skills to develop map work (Duffek, Pluháčková, Stacke 2018). One of the reasons students find it difficult to work with a map may be the way they are taught the strategies of map work (Havelková, Hanus 2021) and whether the development of map skills is carried out systematically with a clear objective.

Řezníčková et al. (2013) stated that, in developing geography skills, teachers do not distinguish between knowledge and skill and struggle with assessing students' skills. The key problem lies in the overall teacher-centred orientation of lessons, which leads not to developing skills in students but to demonstrating skills to them (Řezníčková et al. 2013; Hübelová, Janík, Najvar 2008). These problems result, among other things, in low levels of students' map skills (Mrázková 2013, Hanus 2012). Since the main influence on the level of map skills achieved by students lies with the teachers, it is appropriate to focus on them (Havelková, Hanus 2019).
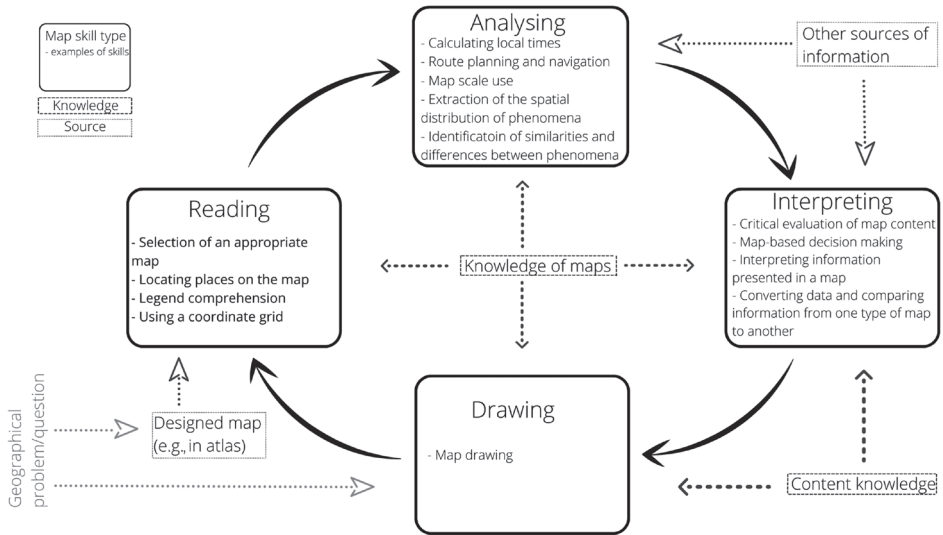
Fig. 1 – Map work in the lesson. Source: Hanus, Havelková (2019), adapted.

Students' ability to use a map as a source of information is a prerequisite for solving geographical problems. As geographical problems tend to be very complex (Marada et al. 2017), complex map skills, including the more cognitively demanding ones of analysing, interpreting, or creating maps (Wiegand 2006), are paramount. For this reason, teachers should follow a logical progression in developing map skills in students, with increasing cognitive demand (Hanus et al. 2020). The procedure revolving around the scheme published by Hanus and Havelková (2019), which was based on a systematic review of different typologies of map skills and approaches to their development (see Havelková and Hanus 2019 for more details), can be taken as a suitable example of comprehensive map skills development (in which maps are seen as a tool for the development of students' geographical thinking). For a systematic development of map skills, teachers should combine this approach with the principles of scaffolding, i.e., building supports for students' learning and then gradually deconstructing these supports. By taking successive steps, the students first master cognitively less demanding skills and progress to a cognitively higher level first with the teacher's help, then do so independently. In this way, students can progress to the development of more cognitively demanding skills with minimal setbacks that might discourage them (Hanus et al. 2020).

Figure 1 shows a graphical representation of the sequential steps in comprehensive map-skill development. The above sequence starting with map reading, which is the least cognitively demanding type of map skill, is one possible approach. The

data obtained from the map through map reading can then be further analysed and interpreted (Wiegand 2006). If the student does not master map reading or analysis, he/she will not be able to interpret the map correctly. In addition, it is also necessary to introduce students to the differences between maps (i.e., develop their knowledge of the differences between maps). Otherwise, students might only master part of the skill with a certain map type and will fail with others. For the comprehensive development of map skills and the subsequent development of their geographical thinking, map skill development must be systematically planned and implemented (Hanus et al. 2020).

4. Methodology

The research has the character of a multi-case study synthesising the findings from each case, i.e., the lines of transformation of educational content. The teaching context of the cases was the situation of the observed teachers and their class reflected in the personal conception of teaching and in the implemented teaching. The disciplinary context of the case (common to all cases) was the disciplinary knowledge of map skills. The individual cases were analysed, compared, and generalised within the framework of the map-skills-development approaches described above (see Slavík et al. 2017).

The exploration of teachers' personal concept is rather complex and can never be fully encompassed. The approach therefore involved examining the manifestations of personal conceptions (in an interview). In contrast, implemented teaching has clearly visible elements. For this reason, it was necessary to choose different methods of data collection: an initial interview, observation and recording of the lesson, and a final reflective interview.

When comparing the different parts of the research, the occurrence of specific map skills (listed in Table 1) defined by Hanus and Havelková (2019) was monitored.

For the research on personal conceptions of teaching, an interview and the use of a card-sorting technique (Conrad, Tucker 2019) were employed to sort individual map skills according to teachers' preferences and importance in their teaching. For the analysis of the rankings of skills, the methodology introduced by Hanus and Havelková (2019) was followed, and then only skills in the 1st–4th position of the constructed ranking were analysed. If a skill is ranked as the most preferred by a teacher, it forms the core of teacher's personal conception and thus intended curriculum. Based on the skills ranking, each teacher was also classified into one of the types defined by Hanus and Havelková (2019).

The lesson planning also included an analysis of the lesson's learning objectives. The objective for the lesson was stated by the teacher during the reflective

Table 1 – Types of map skills and specific map skills with code designations

Map reading	Selection of an appropriate map	A
	Locating places on the map	B
	Legend comprehension	C
	Using a coordinate grid	D
Map analysis	Calculating local times	E
	Route planning and navigation	F
	Map scale use	G
	Extraction of the spatial distribution of phenomena	H
	Identification of similarities and differences between phenomena	I
Map interpretation	Critical evaluation of map content	J
	Map-based decision making	K
	Interpreting information presented in a map	L
	Converting data and comparing information from one type of map to another	M
Map drawing	Map drawing	N

Source: authors

interview immediately after the lesson. During the analysis, occurrence of each map skill from Table 1 was sought in these objectives.

As part of the implementation of the model lessons, teachers were asked to plan and teach one lesson focusing on the intensive and comprehensive development of map skills according to their personal conception. The implemented lessons were recorded on a camera (one static capturing the students from behind and one dynamic focused exclusively on the teacher). Areas of students' map skills development were then isolated from the recordings, and these were further analysed for the occurrence of particular map skills. Subsequent comparisons of the occurrence of specific map skills in all three parts of the research were used to analyse the systematicity of individual skill development across curriculum levels.

The ethical aspects of the study have been considered and approved by the Institutional Review Board, Faculty of Science, Charles University (approval number 2022/26).

5. The research sample and the educational context of teaching

An accessible sample of 20 lower secondary teachers of elementary and grammar schools participated in the research. To participate in the research, a teacher had to be fully qualified to teach geography. The teachers who participated in the research had varying lengths of experience (from a few months to 30 years). Nineteen schools from Prague and the Central Bohemian region participated in the research. The sample included large cities schools and rural schools with fewer students.

Table 2 – Characteristics of the research sample

ID	Sex	Second qualified subject	Length of practice (in years)	Grade (model lessons)	Topic of the lesson	Type of school	Type of teacher (according to personal concept of teaching)
1	M	Mathematics	3	9.	Languages	G	Problem-oriented
2	M	PE	14	9.	Protection of nature and climate in Czechia	G	Problem-oriented
3	M	PE	15	8.	Southwest Asia	G	Undefined
4	W	PE	15	8.	Australia and Oceania	G	Resource-oriented
5	W	Mathematics	13	9.	Climate and water of Czechia	G	Resource-oriented
6	W	Biology	20	8.	Eastern and Southeastern Europe	G	Resource-oriented
7	M	Mathematics	11	9.	Eastern Europe	G	Undefined
8	W	Mathematics	10	8.	Netherlands	G	Undefined
9	W	Mathematics	25	9.	Tourism	G	Undefined
10	M	Biology	0.2	9.	Navigation	G	Resource-oriented
11	W	History	7	7.	Regions of Africa	E	Navigator
12	W	Biology	5	8.	Northern Europe	E	Problem-oriented
13	M	Mathematics	10	8.	Eastern Europe	E	Resource-oriented
14	M	Civics	2	8.	Agriculture in Europe	E	Resource-oriented
15	W	Mathematics	22	8.	Relief of Czechia	E	Problem-oriented
16	W	PE	30	6.	Hydrosphere	E	Resource-oriented
17	W	Biology	0.5	8.	Israel	E	Undefined
18	W	Biology	6	8.	Surface and soils of Czechia	E	Resource-oriented
19	W	Biology	0.8	7.	South America	E	Resource-oriented
20	W	Biology	4	8.	Soil erosion in Czechia	E	Resource-oriented

Source: authors

The characteristics of each participant are shown in Table 2. The year and topic of the model lesson could be chosen by the teacher. Most teachers chose to teach in grade 8 or 9. The lessons studied dealt mostly with regional geography of the world or Czechia.

6. Results

6.1. What is the personal concept of map skills development?

According to methodology of Hanus and Havelková (2019), the most common teacher type in the research sample was resource-oriented teachers (10 teachers). Only one teacher was classified as a navigator. Four teachers were problem-oriented and five teachers undefined, as they could not be clearly classified because they were at the interface of the two different types (Table 2).

Table 3 – Frequency of ranking of each skill among the most preferred. Skills are ranked according to the coding in Table 1.

Skill type	Skill	Code	Number of teachers who ranked the skill as preferred
Map reading	Selection of an appropriate map	A	13
	Locating places on the map	B	10
	Legend comprehension	C	14
	Using a coordinate grid	D	3
Map analysis	Calculating local times	E	0
	Route planning and navigation	F	5
	Map scale use	G	0
	Extraction of the spatial distribution of phenomena	H	5
	Identificatoin of similarities and differences between phenomena	I	5
Map interpretation	Critical evaluation of map content	J	2
	Map-based decision making	K	8
	Interpreting information presented in a map	L	10
	Converting data and comparing information from one type of map to another	M	1
Map drawing	Map drawing	N	2

Source: authors

Nineteen out of 20 teachers had at least one map reading skill among their top preferred map skills. Overall, the least preferred skills were map drawing and map analysis, though 11 teachers ranked one of the map analysis skills in the top third of their most preferred skills. Four teachers did not prefer map interpretation skills at all. Two teachers also ranked map drawing among their most preferred skills (Table 3).

From the overall results, there is a clear dominance of map reading among the teachers' most preferred skills. For 17 teachers, map reading skills account for at least half of their most preferred skills. Additionally, some of the teachers set higher educational objectives for the development of map skills than those required by the FEP (MŠMT 2021).

6.2. What learning objectives do teachers formulate when developing map skills?

This part of the research revealed the major problems that teachers have in setting teaching objectives. When asked *What was the objective of your lesson?* a considerable share of teachers reported what they taught students in the lesson, such as in teacher 3, *"To introduce students to Southwest Asia".* However, a properly formulated

objective should be student centred, i.e., what the student was supposed to learn (Kolář, Vališová 2009). In practice, teachers often set objectives for themselves, not for their students (Slavík 1995). Given the assignment of planning a lesson that focused on developing map skills, it was expected that the lesson objective would reflect this requirement. Yet, most teachers did not include the development of skills (of any kind) in their objectives. Therefore, it was necessary to specifically inquire about the map-skills-development objective. Teachers often stated that their objective was general map skills development, but such an objective is very general and broad for a single lesson. This finding confirms the major problems in setting both content and skill-development objectives.

It was thus very difficult to identify the specific skills teachers aimed to develop. It was impossible to identify any such objective for some teachers: *"To practise work with maps and climagrams"* (teacher 5) or *"To incorporate maps into a lesson about the Netherlands"* (teacher 8). The opposite was the case, for example, with teacher 2, who stated his objective clearly and specifically: *"To infer from different maps what the map does/does not show and what I infer from it based on my knowledge. Then assess the spatial distribution of phenomena and identify the reasons for this spatial distribution."*

When analysing the objectives for developing specific map skills, map reading skills were the most frequently identified. When it was possible to identify which specific skill the teacher planned to develop, it was predominantly locating places on the map. The skill of map drawing was also present (for three teachers). The map interpretation objectives were also set by three teachers, such as *"To locate linguistically diverse areas and to look for the causes of this distribution on physical-geographical map"* (teacher 1).

The analysis of teaching objectives showed that teachers have difficulty setting objectives, especially in skills development. Their objectives are usually too general and teacher oriented. It can therefore be assumed that teachers have not thought through or verified the achievement of these objectives. Thus, they do not obtain a basis for evaluating and reflecting on their teaching. This problem likely has significant implications for curriculum implementation.

6.3. Which map skills do teachers really develop in their lesson?

The assignment for all teachers was the same, but its fulfilment, as expected, varied considerably in terms of teaching strategies. Some teachers chose group work, others a worksheet on which students worked independently or in pairs. The use of class time also varied considerably (Fig. 2). The assignment emphasised developing map skills as much as possible. However, one of the teachers (teacher 8) spent only 33% of the lesson on map work. The rest of the class time was teacher-centred
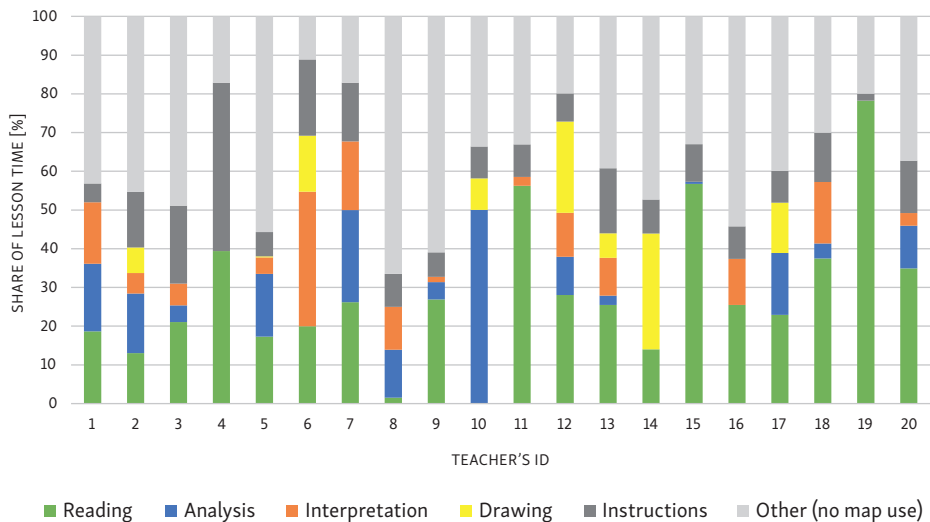
Fig. 2 – Structure of the lesson according to type of map skills developed. Source: authors.

lecturing. On average, students spent half of the lesson time developing their map skills. The rest of the time was spent by the teacher on the assignment or other activities (interpretation, organisation, etc.).

In addition to the time spent on map skills development itself, the structure of the skills developed varied considerably. Two teachers (teachers 4 and 19) developed only map reading during the lesson. Teacher 15 also developed mostly map reading but included one map analysis question.

A total of four teachers developed two types of skills in their lessons. Teacher 10 developed map analysis (route planning) and map drawing. Teachers 11 and 16 focused their tasks on developing reading and interpretation. Teacher 14 focussed on reading and map drawing. However, these four teachers always "skipped" at least one level in developing map skills, especially in the transition from map reading to map interpretation. More gifted students or students who already mastered map skills at all cognitive levels may be able to make this transition without difficulty, but this may cause inexperienced or weaker students to fail on more cognitively demanding tasks (Hanus et al. 2020; Havelková, Golebiowska 2019).

The other 14 teachers implemented a lesson that covered three or more types of map skills. Such lessons can be considered varied, as they aim at developing a wider range of map skills. However, they cannot be said to be perfect. Moreover, the aim of this research is not to look for lessons that comprehensively develop map skills but lessons that do so systematically. The key question is therefore whether the implemented teaching corresponds to the teacher's personal conception and the stated teaching objective.

Table 4 – Number of teachers who developed each skill in the lesson

Skill type	Skill	Code	Number of teachers who have developed the skill in the model lesson
Map reading	Selection of an appropriate map	A	6
	Locating places on the map	B	**19**
	Legend comprehension	C	4
	Using a coordinate grid	D	2
Map analysis	Calculating local times	E	1
	Route planning and navigation	F	1
	Map scale use	G	4
	Extraction of the spatial distribution of phenomena	H	**11**
	Identification of similarities and differences between phenomena	I	4
Map interpretation	Critical evaluation of map content	J	3
	Map-based decision making	K	1
	Interpreting information presented in a map	L	**14**
	Converting data and comparing information from one type of map to another	M	0
Map drawing	Map drawing	N	8

Source: authors

Teacher 2 developed the highest number of different skills in a single lesson (9 of the 14 examined skills). This number of skills was considerably higher than the other teachers', with the second highest being five. On the other hand, teacher 19 developed only one skill, namely locating places on a map. The average number of skills developed was four, which was achieved by six teachers, and six teachers developed an above-average number of skills.

Table 4 demonstrates a high occurrence of one specific skill for each type of map skills. Among the map reading skills, locating places on the map was the most frequently developed skill; among map analysis skills, extraction of the spatial distribution of phenomena dominated; and, in interpretation, interpreting the information in the map was the most common. Two of these skills were also among the frequently preferred skills in teachers' personal perceptions. Thus, we see a rather one-sided focus on the development of certain skills. It is possible to conclude that these skills are the most typical representatives of each skill type.

The low prevalence of skills such as working with a coordinate grid, calculating local times, and route planning can be explained by their specific or limited use. Skills such as critically evaluating map content or converting data and comparing information from one type of map to another are also not included in daily teaching. These are skills with very high cognitive difficulty and require the use of special maps or other resources that may not be available for all topics taught.

In the implemented lessons, the dominance of time devoted to map reading at the expense of other map skills was confirmed. The lessons implemented varied in terms of map skills development, with most teachers developing map reading, analysis, and interpretation skills, and some even developing map drawing skills.

6.4. Are students' map skills developed systematically?

In identifying teachers who systematically develop at least some of the map skills in their teaching, we again encountered the problem of lesson-objective setting. Since the relevant lesson's objectives occur rarely, it is difficult to find teachers who prefer a skill in their personal conceptions, state this skill in the objectives, and then implement it in the model lessons. The occurrence of some of the skills in all three curricular levels was found in four teachers (2, 7, 11, and 12). Each of them systematically developed only one skill (Fig. 3). These four teachers displayed the highest degree (although still relatively low) of curriculum fidelity and systematic development of map skills among the entire sample. In addition to the occurrence of systematic skill development, teacher 11 is also interesting in that all of the skills identified in this personal concept were always present in at least one other level of curriculum. Thus, this teacher performed quite systematically, albeit through the lens of the complexity of the map skills developed, with a strong emphasis on the development of simple map reading. Two teachers (teachers 2 and 7) were able to systematically develop the skill of map analysis (looking for the spatial distribution of phenomena). Teacher 12 even systematically developed the skill of map interpretation. However, apart from this one systematically developed skill, teachers 7 and 12 were only able to develop one other skill that occurred in at least two parts of the research. In contrast, teachers 2 and 11 developed three other skills that occurred in two parts of the research. Thus, teachers 2 and 11 performed the most systematically of the teachers studied.

If we reduce the criteria for fidelity and systematicity and consider it sufficient if the skill was present in two of the three levels of the curriculum (in different combinations), the number of systematically developed skills increases considerably. We then find at least one such skill in 19 of the 20 teachers. Teacher 19, the sole teacher who did not demonstrate any level of systematic development of map skills in his teaching, developed completely different skills in the implemented lesson than those he stated as preferred in his personal conception.

However, other teachers also displayed that the development of map skills is not very systematic. The teachers for whom only one skill was identified in two parts of the research were teachers 1, 5, 10, and 14. This was most often due to a combination of occurrence in the preferred skills in their personal concept and the implemented lesson, which was also due to the number of occurrences
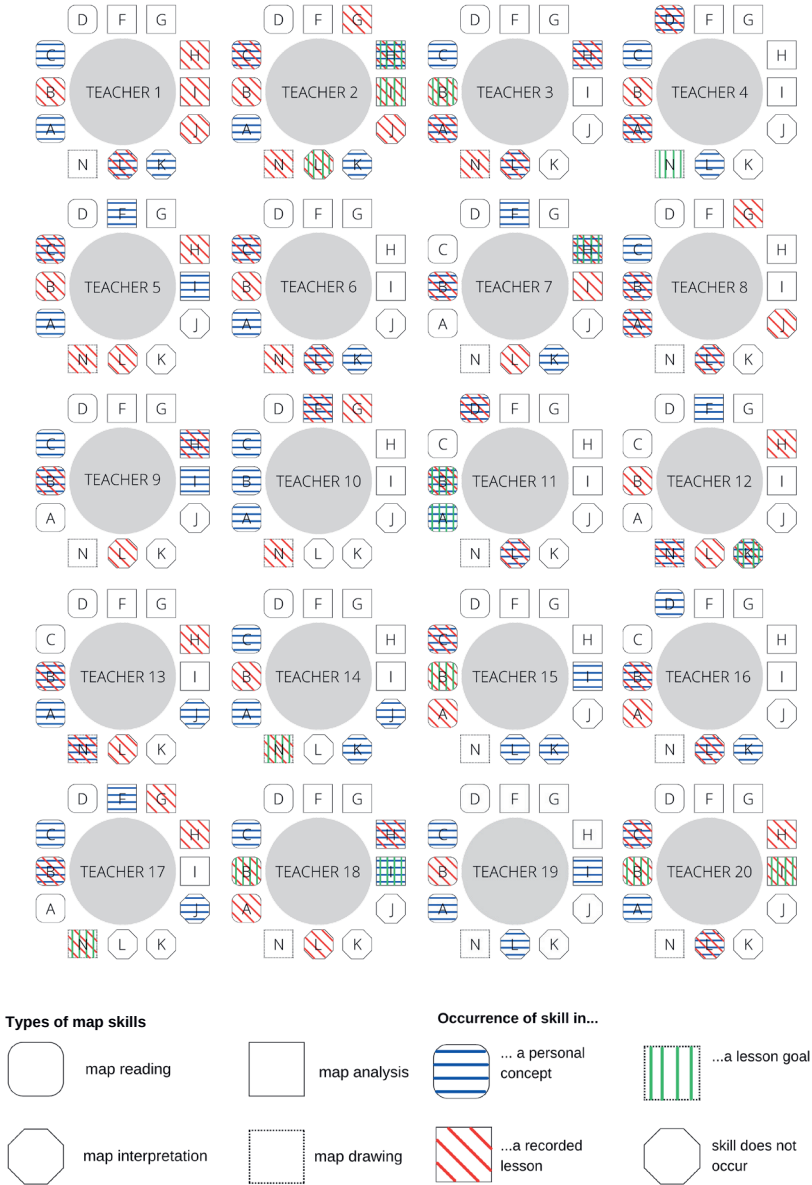
Fig. 3 – Curriculum fidelity of map skills in each teacher. Source: authors. Abbreviations: A – Selection of an appropriate map; B – Locating places on the map; C – Legend comprehension; D – Using a coordinate grid; F – Route planning and navigation; G – Map scale use; H – Extraction of the spatial distribution of phenomena; I – Identificatoin of similarities and differences between phenomena; J – Critical evaluation of map content; K – Map-based decision making; L – Interpreting information presented in a map; N – Map drawing. Skills E and M were not displayed because they were not recorded more than once in the results.

in those two areas being higher than the number of skills identified in the objectives area.

Most teachers (4, 6, 9, 13, 15, 16, and 17) developed exactly two skills so that they occurred in two parts of the research. For each of these teachers, at least one of the skills developed in this way was a map reading skill. For teachers 4 and 15, both skills developed were of the map reading type. Teachers 13 and 17 developed map reading and drawing skills, and 9 and 16 developed map reading and map interpretation skills. Teacher 6 developed map reading and analysis.

Teachers 8 and 18 systematically developed a total of three skills in the two parts of the research. Teacher 8 repeated two map reading skills and one interpretation skill in two parts of the research. Teacher 18 developed one map reading skill and two map analysis skills. Three skills indicate systematicity, as their inclusion is no longer likely to be random.

Two teachers (3 and 20) were able to develop the four skills more systematically. The skill of locating places on a map emerged for both teachers in the objective set and in the teaching implemented but not in the personal conceptions. Teacher 3 was able to almost implement all the skills from his personal conception. The only difference was in skill C, which was selected as a preferred skill but was replaced by skill B in the implemented lesson.

The skill of selecting the appropriate map shows interesting results. Thirteen teachers selected this skill among their preferred ones. In their objectives, however, no teacher mentioned this skill, but six did develop it in the implemented lesson. The selection of the appropriate map in the lesson was often done by the teachers for their students – they directly told the students what map to use for the task (five teachers) or directly gave the students only the map needed to solve the task (two teachers), so no map-selection skills development took place in their lessons. Thus, teachers did not lead students to developing this skill, which can be considered one of the most important, as it entails selecting the appropriate source to solve a problem or question. Řezníčková et al. (2013) noted such a problem when they observed that teachers demonstrate skills rather than develop them in students.

A similar mismatch between preferences and realized teaching can be observed for the skill of comprehending a legend. This skill was the most preferred in the teachers' personal conception of map skills development. However, only four teachers developed this skill. Here, however, the explanation is different from the previous case. All students had to use this skill in the observed lessons. In any use of the map, this skill is applied. However, it only appeared in the lessons analysed when the teachers gave students a task aimed at understanding the legend. If this skill was only implicit in the assignment, it was not recorded in the data.

7. Discussion

Research on personal conceptions of map skills development, the objectives of map skills development, and model lessons shows that there is little fidelity between these parts of the planned and implemented curriculum. The key problem lies in objective setting. The participating teachers did not usually set the objectives of the lesson in advance and often substituted them with the lesson's topic, methods, or teaching strategies. The formulation of objectives in the form of students' expected performance and their subsequent presentation to students was not observed in any teacher. These results align with those of Stará and Starý (2018), who in their research recorded the objectives only implicitly and even had to infer them retrospectively from the observed lesson or the teacher's materials.

Objectives are a fundamental part of teaching, and their absence can prevent students from achieving the curriculum requirements. This is because if students do not know or fully understand the objectives, they cannot meet them (Nicol, Macfarlane Dick 2006). Ignorance of the objectives, not understanding them, or even their total absence can also contribute to students' low motivation to engage in learning (Bin Abu Bakar et al. 2014).

The results of the research suggest a rather varied (in)systematic development of mapping skills. Teacher 15, who preferred the skills of reading, analysis, and two skills of interpretation in his personal conception, exemplified this issue, as he only developed the skills of reading in the implemented teaching. Such a finding reflects the inconsistency identified by Bednarz, Acheson, and Bednarz (2006), who found that teachers set cognitively higher objectives than those they subsequently implement in their teaching. However, the reverse also occurred: teacher 8 exhibited a preference for three reading skills and one interpretation skill but developed both reading and analysis skills and two interpretation skills. In the implemented teaching, he was therefore more complex and directed (probably unconsciously) towards higher cognitive objectives than in his personal conception.

In addition to the prevailing low level of systematic map skills development, the research confirms the dominance of the development of low cognitively demanding map skills, i.e., map reading. While the more cognitively difficult skills were found in all parts of the research, their frequency of occurrence was inconsistent. Nonetheless, teachers still met the current curriculum requirements for map work (Hanus, Marada 2013). This result points to a need to revise the FEP to target more cognitively demanding skills to ensure that the curriculum reflects international trends in geography education and the skill requirements for life in the 21st century (Bednarz, Heffron, Huynh 2013).

Fidelity of curriculum is key to systematic learning. If not realised, as our research suggests, it is very difficult to achieve educational objectives. Because of

the incoherence between the different levels of curricula, we agree with Slavík et al.'s (2017) assertion that, in educational research, it is insufficient to examine only the opinions of teachers or students to determine the level of knowledge or skills; it is also necessary to verify these findings directly in real lessons.

However, the presented results have their limits. The personal conceptions were investigated by employing the method of ranking skills, which may not fully cover the complexity of the teachers' personal conceptions. Further, teachers were not asked to formulate objectives for the lesson observed in advance. If they had known that a lesson objective would be required, it is possible that they would have devoted more thought to this aspect. While such an approach may provide an interesting avenue for future research, the chosen approach was more reflective of teachers' everyday practices.

Another possible limitation stems from the fact that the implemented teaching was recorded. Though the teachers reported that their presence had only a minimal impact on them and the students, the researcher and camera almost certainly had some effect on the lesson (Hübelová, Janík, Najvar 20008). Specifically, teachers often reported that they were nervous at the beginning of the lesson but that they behaved quite normally. Only one teacher reported that the presence of the camera made the students feel uncomfortable and that they did not behave as in a normal lesson.

The findings also could have been affected by the sample selection process. The research was mostly attended by teachers connected to the researchers or their institution. Most of these teachers can thus be seen as committed to the cause of improving school geography, and their motivation to participate may reflect their openness to personal development and their desire to continuously improve. Resultingly, they may not be representative of geography teachers as a whole.

Future research would benefit from (i) observing more than one lesson of a given teacher, as the topic of the lesson also conditions the choice of map skills to be devloped, (ii) complementing the investigation of planning and implementation with an evaluation of the teaching process, and the performance of the students. It would thus be possible to determine the extent to which a given teacher's systematic teaching is effective overall. As Bol and Strage (1996), in cases like the ones outlined here, we should expect a mismatch between the teacher's objective (non) setting and his/her assessment of the students. Thus, it can be assumed that more inconsistencies in teachers' actions could be identified, and this area should be given more attention by researchers and educators of future teachers.

Conclusion

The presented findings point to a problem in setting educational objectives and the overall process of curriculum development for Czech teachers. Further research is needed to address this issue, as setting and meeting short-term objectives is essential for meeting long-term objectives and curriculum requirements as a whole (Santrock 2011). With curriculum reform ongoing, it is crucial to understand how teachers work with objectives and therefore how to help them implement the objectives contained in the new FEP.

Why do teachers teach what they teach? How do their students know what to learn? On what basis do teachers assess their students if they do not set specific objectives and plan instruction systematically? These are all questions that arise from the findings of this article.

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