

Teachers' Linguistic Environment as a Determinant of Adaptive Instruction in Slovak as a Second Language Education

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Abstract – This study conceptualizes the teaching of Slovak as a second language in primary schools with Hungarian as the language of instruction in Slovakia as an adaptive system of didactic decision-making shaped by teachers' language environments and professional practices in a minority educational context. The study examines how teachers' use of Slovak in and outside school, classroom language behaviour, perceived learner language difficulties, and institutional factors influence the application of teaching approaches, drawing on a nationally representative sample of primary school teachers (N=257). Using principal component analysis, eight dimensions of teaching approaches were identified, reflecting distinct profiles of adaptive instruction. Subsequent analyses indicate that teachers' methodological decisions are systematically associated with their extracurricular contact with Slovak, functional language use in the classroom, perceived learner difficulties, and school-related contextual variables, rather than being determined solely by fixed methodological orientations. The findings highlight the dynamic and context-sensitive nature of Slovak L2 instruction in minority education and underscore the central role of teachers' language practices beyond institutional settings.

The study proposes an empirically grounded model of adaptive didactic decision-making that contributes to research on state language teaching in minority contexts and offers implications for the pedagogical regulation of bilingual primary education.

Keywords – Minority education, Slovak as L2, didactic decision-making, adaptive instruction, primary school.

1. Introduction

In a bilingual school environment, namely primary schools with Hungarian as the language of instruction in Slovakia, teachers of Slovak as L2 (Slovak language and Slovak literature) make decisions about teaching methods in conditions of uneven language contact, different levels of use of Slovak in and outside of school, and heterogeneous language needs of students. While teaching approaches are often discussed in terms of preference (e.g., explicit or communicative orientations), considerably less attention is given to how teachers' and schools' language environments shape adaptive didactic decision-making and influence the practical use of specific teaching strategies.

Within the context of teaching state languages within minority education across the Carpathian Basin, there are seven nations in Central and Eastern Europe, where minority Hungarian languages are used: Slovakia, Ukraine, Romania, Serbia, Croatia, Slovenia, and Austria. Although in the majority of these, the Hungarian language boasts a significant number of speakers and all of these areas share borders with the kin-state of Hungary, the way the respective states engage with the language policies is diverse with a direct influence on the manner in which children acquire the state language alongside their mother tongue. Several of these states promote inclusive language policies, i.e., Hungarian minority language having a legal status that is equal to the state language. Serbia, for instance, follows an official policy that supports a multilingual and multicultural society in which the Hungarian community has equal rights to the Serbian majority.

DOI: 10.18421/TEM153-90

<https://doi.org/10.18421/TEM153-90>

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Received: 14 January 2026.

Revised: 21 April 2026.

Accepted: 08 May 2026.

Published: 27 August 2026.

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Similarly, do so in Slovenia, Croatia, or Austria. The Serbian system is supported by a legal framework that guarantees that educational classes across all tiers: primary, secondary, and tertiary - are offered in Hungarian, provided that a minimum of 15 students express a desire to enroll in a first-grade group [1]. Moreover, this model is distinctive due to its incorporation of the Hungarian National Minority Council (HNMC), an entity that implements non-territorial autonomy to formulate innovative strategic frameworks for the utilization of minority languages in educational settings and public discourse [2]. Other states, such as Slovakia, Romania, or Ukraine, on the other hand, have exclusive language policies, according to which Hungarian is subordinated to the official state languages [3]. In Romania, a notable pedagogical transformation took place with the implementation of Ministerial Decree 3393/2017, which established a dedicated curriculum for instructing the Romanian language to students of the Hungarian minority [4]. This regulation marked the first deviation from the previous "one-size-fits-all" national curriculum that treated both native and non-native speakers in the same manner. The revised program focuses on a competence-based methodology and aligns the acquisition of the Romanian language with the Common European Framework of Reference for Languages (CEFR). Importantly, this framework recognizes Romanian as a "second language" (*a doua limbă*) for Hungarian native speakers, acknowledging that for this minority, the process of learning the state language constitutes a unique socialization experience that facilitates the expression of thoughts and personal experiences from birth throughout life [5].

When it comes to education, there are significant differences in how minority language education and state language instruction function. Some of the states offer fewer options for learning in the minority language (Austria) or only provide minority language instruction in early primary education without the possibility of progressing into secondary education [6]. States like Croatia, Slovenia and Serbia promote functional bilingualism and provide a wide array of possibilities for education. Slovakia allows Hungarian as a medium of instruction with Slovak as a compulsory subject across the curriculum [7]. Slovak as L2 encounters unique linguistic challenges that stem from the structural differences between Slovak and Hungarian. Research in SLA consistently shows that learners' L1 background shapes their L2 development across phonology, morphology, syntax, and discourse, with structural similarity and contrast influencing both positive and negative transfer effects [8], which helps in explaining why Hungarian speakers struggle with Slovak structures.

In order to address these challenges, research on communicative language teaching and learner-centred pedagogy emphasises the development of communicative competence, active engagement, and varied instructional techniques as effective ways to support meaningful L2 learning and mitigate negative transfer impacts [9], [10].

The preferred approaches to teaching and the choice of teaching methods/materials are highly influenced by a complex network of knowledge, beliefs and experiences of teachers. It is not only teachers' prior experiences with learning and their professional education that shapes their instructional decisions, but also the availability of materials and classroom realities [11]. Research indicates that although teachers' beliefs are, perhaps, in alignment with communicative and learner-centred approaches, outside influencing factors can have a negative influence in how those beliefs manifest in reality [12]. These results also correlate with [13], who argue that teachers often have conflicting beliefs regarding teaching, particularly in the context of communicative versus grammar-focused methods that stem from their theoretical knowledge, teaching experiences, perceived needs of learners, and expectations set by the curriculum, all of which influence their choices concerning instructional methods. Their study shows that although teachers often advocate for communicative approaches, certain situational limitations, such as class management or curriculum requirements may take precedence over their preferred strategies. Thus, didactic decisions of teachers cannot be predicted merely by their self-beliefs, much rather by contextual situational factors that are found to be stronger determinants for their instructional choices [14]. Epistemological beliefs about language learning, however, do have influence on the teaching roles that teachers adopt [15], which can directly be linked to didactic choices and interaction in classroom. Moreover, decision making is found to be reflective and subject to development, as well [16].

Research also shows that teachers' decisions are not exclusively determined by fixed approaches and pre-set curricula, but are dynamic and responsive to learners' needs, contextual constraints and environment conditions. Teachers that have developed adaptive skills keep using diagnostic information regarding the teaching process for customization, which results in demonstrating a spectrum of responsive strategies instead of using rigid methods [17]. Adaptability encompasses real-time changes within the education process, i.e., diagnostic inquiring, customized prompts, and adaptive support, which positively influence learning outcomes [18].

Adaptive teachers have tendencies to make the education process more effective by modifying curricular resources and tailoring the instructional methods to the changing needs of both their learners and environment [19]. Thus, adaptive teaching can be viewed as fluid, reflexive and responsive, as opposed to rigid variation of methods in teaching. Adaptive teaching perspective highlights that teacher decisions often go beyond the simple choice of teaching methods or techniques, but are rather grounded in their beliefs, epistemic tools and overall orientation [20].

The aim of this study is to verify the factor structure and reliability of a questionnaire on teaching methods among primary-level teachers in schools with Hungarian as the language of instruction in Slovakia (hereafter Hungarian-medium primary schools), and to examine how the reported use of teaching methods varies in relation to the language environment of the school, teachers' linguistic behaviour in the classroom (including the language of instruction and explanation of unfamiliar concepts), and selected contextual variables (e.g. school location, career level). At the same time, the study investigates how language use inside and outside school, teachers' perceptions of learners' language difficulties, and contextual conditions shape adaptive didactic decision-making in the teaching of Slovak as L2. Based on the findings, the study aims to propose a regulatory model of adaptive Slovak L2 teaching tailored to minority primary school contexts.

The following research questions guide the inquiry:

(1) *What is the validity and reliability of the measurement tool for assessing teaching methods of Slovak as a second language in the population of primary level teachers in Hungarian-medium schools in Slovakia?*

(2) *Which teaching methods and approaches do primary level teachers in Hungarian-medium schools in Slovakia use most often in Slovak lessons?*

(3) *Are there differences in the scores of individual dimensions of teaching approaches, as declared by teachers, depending on individual variables (region in which the school is located, teacher's career level, school language environment, teacher's language behaviour in the classroom, teacher's command of a foreign language, use of digital aids)? Are these differences statistically significant?*

(4) *What other determinants influence teachers' decision-making when choosing teaching approaches in Slovak language and Slovak literature classes?*

2. Material and Methods

In order to address the reported use of teaching methods and the goodness of variables of the questionnaire, a quantitative inquiry was carried out. The following subsections provide detailed information into the methodology of research.

2.1. Methodology

The research was conducted as a quantitative cross-sectional study focused on empirical modelling of adaptive didactic decision-making of teachers teaching Slovak as a second language (L2) in Hungarian-medium primary schools in Slovakia. The analyses were performed in the IBM SPSS Statistics for Windows program, and the results were interpreted primarily based on the recommendations of several authors [21], [22].

2.2. Measurement

The methodological questionnaire for Hungarian-medium primary teachers was designed with the aim of examining the teachers' declared scores of selected dimensions of teaching methods applied in the process of acquiring Slovak as L2. The questionnaire contained 31 items capturing the frequency of application of 11 established methods and approaches in teaching foreign languages - the Grammar-Translation method, Communicative Approach, Task-Based Language Teaching (TBLT), Content and Language Integrated Learning (CLIL), Intercultural Communicative approach, Total Physical Response (TPR), Teacher-led Explanatory method, the Reproductive (practice-based) method, the Problem-based instructional method, Heuristic (discovery-based) method and Project-based Learning. The frequency of use of individual methods was determined using a 4-point Likert scale (never; sometimes; often; always).

2.3. Sample

The research sample was designed to reflect as closely as possible the structure of the target population, defined as all teachers working at the primary level in Hungarian-medium schools in Slovakia. Respondents were selected using regional stratified sampling, with approximately 23% of teachers from each region included in accordance with their proportional representation in the population. To ensure balanced geographical coverage, teachers from all districts of Slovakia in which Hungarian-medium primary schools or Hungarian-medium classes operate were represented to a comparable extent.

This sampling procedure ensured a high degree of representativeness with respect to the size, typological composition, and geographical distribution of the target population.

The research tool was processed in online form and made available via the server of the J. Selye University. Access to the questionnaire did not require entering an access code or password, respondents logged in via mobile devices (smartphones or tablets). The anonymity of respondents was fully ensured and no identifying data was recorded during data collection. Before data processing, a quality control of questionnaire completion was carried out. Records of respondents whose time to complete individual sections of the questionnaire was shorter than 120 seconds or longer than 1,400 seconds were excluded from the file, as these extreme values indicated a high probability of a non-standard or unreliable way of answering (e.g., answering too quickly or excessively lengthy). The final analytical file consisted of 257 valid respondents (N=257). Almost all respondents (98.8%) reported Hungarian as their mother tongue. In terms of ethnicity, 88.7% identified themselves as Hungarian, while 11.3% declared Slovak. These results do not only reflect the high proportion of Hungarian-speaking teachers, but also point to the complex nature of linguistic and ethnic identity in the bilingual environment of southern Slovakia.

The research sample was significantly dominated by women (96.1%; N=247), which corresponds to the long-known trend of feminization of the teaching profession not only in Slovakia, but also throughout the European Union [23]. In terms of career level, the research sample included independent teachers (33.9%), teachers with first level of teacher certification (34.6%) and teachers with second level of teacher certification (31.1 %), while novice teachers were only minimally represented (0.4%). Regarding the language microregion, the majority of respondents stated that their school was located in a Hungarian language environment (73.2%; N=188).

The sample of respondents was geographically diversified – teachers worked in schools located in the Nitra Region (36.2%), Trnava Region (23.7%), Banská Bystrica Region (17.9%), Košice Region (17.5%), and Bratislava Region (4.7%), thus ensuring a regionally balanced representation of areas with Hungarian language instruction in Slovakia.

3. Results

For a better clarity, the research results are divided into several subsections. The first subsection introduces the verification of the measuring instrument.

Following that, the most frequent teaching methods and approaches are portrayed.

Subsequently, various adaptive variations of teaching approaches are illustrated, along with other determinants influencing L2 teaching decision making. Lastly, the results are summarised into an adaptive teaching regulatory model.

3.1. Verification of the Measuring Instrument

To answer the first research question: (1) What is the validity and reliability of the measurement tool for assessing teaching methods of Slovak as a second language in the population of primary level teachers in Hungarian-medium schools in Slovakia, an analysis of the factor structure of the measuring instrument capturing the teaching methods applied by teachers was performed. The value of the Kaiser-Meyer-Olkin measure of selection adequacy (KMO=0.803) indicates that the set of variables is suitable for factor analysis, as it exceeds the threshold of 0.80 (Table 1), which is considered a very good level of adequacy in social science research [21]. Bartlett's test of sphericity ($\chi^2(325)=2022.183$; $p<0.001$) also confirmed the validity of the use of factor analysis, as the correlation matrix is statistically significantly different from the unit one. Principal component analysis (PCA) was performed.

Table 1. KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.803
Bartlett's Test of Sphericity	Approx. Chi-square	2022.183
	Df	325
	Sig.	0.000

The communality values after extraction ranged from 0.508 to 0.739, indicating a good degree of explained variance of individual items by the factor model.

The eigenvalue analysis showed that eight components with an eigenvalue greater than 1 together explain 63.303% of the total variance. The scree plot indicated a more pronounced break at approximately the eighth component, which supports the choice of an 8-factor solution. The factor structure thus obtained is theoretically interpretable and corresponds to different types of teaching approaches to Slovak as L2 in Hungarian-medium primary schools.

The analysis applied principal component extraction and subsequent orthogonal Varimax rotation. The rotation allowed the communality values and the total explained variability to be preserved. All eight identified factors could be interpreted in terms of content (Table 2).

Table 2. Factor structure of teaching approaches and their internal consistency (Cronbach α)

Factor	Title	No. of items	Cronbach α
F1	Autonomous / self-regulated learning	4	0.774
F2	Explicit teacher-led instruction	4	0.731
F3	Discovery learning	3	0.737
F4	Communicative practice based on models and real-life tasks	2	0.624
F5	Input-based language instruction	3	0.587
F6	Active communicative language learning	2	0.624
F7	Reception-based instruction	2	0.601
F8	Reproductive pattern-based instruction	2	0.591

Based on the content analysis of the items with the highest factor loadings, 8 factors were identified that express the characteristics of teaching methods with their dimension described as follows:

F1: Autonomous / self-regulated learning

This factor represents situations in which students independently process the curriculum, use their own procedures to find solutions to tasks and purposefully search for information necessary to complete the assignment. The teaching process is focused on developing student autonomy – students take responsibility for their own learning, they plan and monitor their progress, and reflect on their performance. They combine cognitive, motivational and behavioural strategies (planning, self-monitoring, self-reflection), which leads to higher engagement and better learning outcomes.

F2: Explicit teacher-led instruction

The factor concentrates items describing detailed explanations of grammatical phenomena and rules, emphasis on accurate translation and understanding of meaning, reading and translating sentences or texts from Slovak to Hungarian, or explanation of grammatical rules prior to their application. In this approach, the teacher dominates as a source of information, who explains the language system explicitly and the students subsequently practice this knowledge in controlled tasks. The emphasis is on accuracy, systematicity and control of language form.

F3: Discovery learning

This factor is saturated with items indicating the possibility of developing and applying one's own creativity, independent discovery of new knowledge, space for cooperation, and mutual interaction of students. Teaching is constructivist in nature – students actively explore the language, look for rules and structures, while the teacher acts as a facilitator guiding the process of discovery through questions, challenges, and thoughtful tasks. The approach supports critical thinking and problem-solving skills.

F4: Communicative practice based on models and real-life tasks

The factor combines the practice of dialogues according to a provided model and the solution of tasks based on real-life situations (e.g., planning a trip, writing a letter). The didactic process is two-stage: first, there is controlled practice of a model dialogue, followed by communicative tasks with authentic content. Students thus gain confidence in the form and at the same time learn to use the language flexibly in realistic situations. The approach supports functional language competence and interaction skills.

F5: Input-based language instruction

This factor captures situations when students read Slovak texts, work with tasks containing new knowledge, and imitate language models. The focus is on rich and understandable language input. Students acquire language primarily through reading, listening, and observing language patterns, with grammar and vocabulary internalized implicitly in context. This approach focuses on developing reception and linguistic intuition as the basis for later fluent production.

F6: Active communicative language learning

The factor includes items referring to the use of gestures, movements, and playful physical reactions in learning, role-playing, and performing dialogues in real-life situations. The approach combines kinaesthetic elements with communicative activities. Gestures and movement support the understanding and memorization of language expressions, while role-play enhances practice of dialogues in context. Experiential learning is created, which strengthens the motivation and active involvement of students.

F7: Reception-based instruction

This factor is characterized by the fact that students watch Slovak films and listen to Slovak audio recordings. This is an approach aimed at developing audio-visual and auditory understanding. Students perceive the language through authentic or didactically adapted multimedia examples, become familiar with pronunciation, rhythm and intonation, and learn to decode meaning in a natural context. The understanding thus built forms the basis for subsequent active production.

F8: Reproductive pattern-based instruction

The factor combines items related to learning the language according to a predetermined pattern, and practicing pattern phrases and example sentences. Students work with predefined language structures, which allows them to consolidate grammatical and lexical knowledge and gain confidence in the use of language units. This is an approach focusing on accuracy, systematic practice and control over form, which creates a solid foundation for later flexible and creative communication.

Cronbach's alpha coefficient was used to assess the internal consistency of the individual factors. Cronbach's alpha coefficients (Cronbach α) reached values ranging from 0.591 to 0.774 for individual factors, with factors with three or more items showing good internal consistency, while two-item factors reached lower values (Table 2), which is a natural consequence of the low number of items and represents a known statistical limitation of this coefficient. Nevertheless, the values achieved meet the criteria of acceptable reliability in exploratory research and allow for a meaningful interpretation of the identified factors [22], [24].

The results of the factor analysis show that the measurement tool captures a wide range of teaching approaches used by the participants – from explicit, teacher-led explanations through discovery and autonomous learning to communicative, movement and multimedia-oriented forms of teaching. The eight identified factors form a theoretically consistent and interpretable framework that can serve as a basis for further quantitative research on pedagogical approaches in a multilingual school environment. The measurement tool can be considered valid and suitable mainly for pilot and exploratory purposes, but not for standardized measurement. Some of its dimensions are semantically stable, while others require adjustment, addition of items, and re-verification.

3.2. Most Frequent Teaching Methods and Approaches

To answer the second research question: (2) Which teaching methods and approaches do primary level teachers in Hungarian-medium schools in Slovakia use most often in Slovak lessons, the respondents' scores were calculated for each factor as the sum of the values of the answers to the items belonging to the given factor. These summary scores represent the degree of use of teaching methods and approaches corresponding to the individual factors. Based on the sum of the items belonging to the individual factors, it was possible to determine the order of teaching methods and approaches according to their frequency of use in the respondents' pedagogical practice (Table 3).

Table 3. Order of teaching methods and approaches according to their frequency of use (N=257)

Rank	Factor: title	Mean	SD
1.	F6: Active communicative language learning	3.22	0.50
2.	F2: Explicit teacher-led instruction	3.14	0.58
3.	F5: Input-based language instruction	3.07	0.53
4.	F8: Reproductive pattern-based instruction	2.96	0.48
5.	F4: Communicative practice based on models and real-life tasks	2.89	0.52
6.	F3: Discovery learning	2.85	0.51
7.	F7: Reception-based instruction	2.27	0.55
8.	F1: Autonomous / self-regulated learning	2.02	0.54

In the pedagogical practice of the respondents, teacher-led and input-oriented approaches dominate. The highest level of application was achieved by Active communicative language learning (F6; M=3.22; SD=0.50), which indicates a significant use of movement, situational and experiential elements in the process of acquiring Slovak as L2. High values were also recorded for explicit teacher-led instruction (F2; M=3.14; SD=0.58) and input-based language instruction (F5; M=3.07; SD=0.53), which represent the systematic mediation of language input and an emphasis on understanding the text and language models. A relatively high level of use is also shown by reproductive pattern-based instruction (F8; M=2.96; SD=0.48) and communicative practice based on models and real-life tasks (F4; M=2.89; SD=0.52), which indicates the frequent inclusion of model dialogues and authentic situational tasks in the teaching process.

Discovery learning (F3) occurs at a slightly lower, but still relatively high level ($M=2.85$; $SD=0.51$), which indicates the presence of constructivist elements in pedagogical practice. On the contrary, a lower level of application is shown by reception-based instruction (F7; $M=2.27$; $SD=0.55$) that focuses on audiovisual means of language, and the lowest values were achieved by autonomous and self-regulated learning (F1; $M=2.02$; $SD=0.54$). This result suggests that approaches supporting a high level of student autonomy and self-regulation are applied less frequently compared to teacher-led and input-oriented forms of teaching.

3.3. Adaptive Variations of Teaching Approaches in a Linguistically Differentiated School Environment

In order to comprehensively examine the factors determining the degree of application of individual teaching methods and pedagogical approaches, and for further statistical processing of data, linear regression methods, parametric tests (ANOVA with post hoc Tukey test), and non-parametric alternatives (Kruskal–Wallis test) were applied. Since the tests are sensitive for a sample of $N=257$, the normality of the distribution was verified using the Kolmogorov–Smirnov test and the Shapiro–Wilk test and according to standardized values of skewness and kurtosis (criterion ± 1.96). It can be stated that the normal distribution is shown by factors F1, F3, F6, F7 and F8, while factors F2, F4 and F5 show a statistically significant deviation from the normal distribution. The data analysis aims to answer the third research question: (3) Are there differences in the scores of individual dimensions of teaching approaches, as declared by teachers, depending on individual variables (region in which the school is located, teacher's career level, school language environment, teacher's language behaviour in the classroom, teacher's command of a foreign language, use of digital aids)? Are these differences statistically significant?

3.3.1. Region in which the School is Located

The location of the school (region) is differentially reflected in the application of selected teaching approaches. In the following text, only statistically significant differences are presented. Explicit teacher-led instruction (F2) is represented to a higher extent mainly in the Banská Bystrica and Košice regions ($H(4)=10.89$; $p=0.028$). Active communicative language learning (F6) shows the highest average values in the Bratislava, Nitra and Košice regions, while a lower level of its use is observed in the Banská Bystrica region ($F(4.252)=3.42$; $p=0.010$).

Reception-based instruction (F7) is most intensively applied in the Košice and Bratislava regions, while the lowest level of its use was recorded in the Banská Bystrica region ($F(4.252)=2.90$; $p=0.023$).

3.3.2. Teacher Career Level

Analysis of variance showed that the career level of teachers is reflected in the application of several teaching approaches. A statistically significant difference was demonstrated in the case of five examined dimensions. Explicit teacher-led instruction (F2) is more significantly represented among independent teachers compared to teachers with the first and second levels of teacher certification ($H(3)=10.30$; $p=0.016$). Discovery learning (F3) and Communicative practice based on models and real-life tasks (F4) achieved higher average values among teachers with a higher level of professional qualification, especially with the first and second level of teacher certification (F3: $F(3.253)=3.13$; $p=0.026$; F4: $F(3.253)=4.92$; $p=0.002$). A similar trend was also confirmed for Active communicative language teaching (F6) and Reception-based instruction (F7), which are more pronounced among teachers with a higher career level compared to independent teachers (F6: $F(3.253)=4.96$; $p=0.002$; F7: $F(3.253)=5.01$; $p=0.002$).

3.3.3. School Language Environment

When examining the impact of the school language environment, one-way analysis of variance (One Way Anova) showed statistically significant differences between groups for factors F1 – autonomous/ self-regulated learning ($F(2.254)=10.56$; $p<0.001$), F3 – discovery learning ($F(2.254)=5.77$; $p=0.004$) and F4 – communicative practice based on models and real-life tasks ($F(2.254)=4.09$; $p=0.018$). The results indicate that the highest rate of application of these approaches occurs in school environments with a balanced use of Hungarian and Slovak languages, which confirms that a balanced bilingual school environment appears to be the most supportive for the application of autonomous, discovery and communication-oriented teaching approaches (F1: $F(2.254)=10.56$; $p<0.001$; F3: $F(2.254)=5.77$; $p=0.004$; F4: $F(2.254)=4.09$; $p=0.018$). Post hoc analysis using Tukey's HSD test showed that for factors F1 – autonomous/self-regulated learning ($MD=1.43$; $p<0.001$), F3 – discovery learning ($MD=0.82$; $p=0.002$) and F4 – communicative practice based on models and real-life tasks ($MD=0.46$; $p=0.015$), statistically significant differences occur exclusively between schools in an environment with a predominance of the Hungarian language and schools with a balanced use of the Hungarian and Slovak languages.

3.3.4. Teachers' Language Behaviour in the Classroom

The language used by teachers in the lessons has a statistically significant impact on the application of several teaching approaches, namely autonomous/self-regulated learning (F1: $F(3.253)=3.68$; $p=0.013$), explicit teacher-led instruction (F2: $H(3)=29.33$; $p<0.001$), communicative practice based on models and real-life tasks (F4: $H(3)=13.35$; $p=0.004$), Ac (F6: $F(3.253)=3.07$; $p=0.029$) and reception-based instruction (F7: $F(3.253)=6.18$; $p<0.001$). For factors F6 – active communicative language learning ($F(3.253)=3.07$; $p=0.029$) and F7 – reception-based instruction ($F(3.253)=6.18$; $p<0.001$), the highest average values occurred in groups in which teachers use exclusively or predominantly Slovak in the lessons. Post hoc analysis (Tukey HSD) showed that this encourages mainly autonomous/ self-regulated learning (F1; $MD=2.17$; $p=0.025$), active communicative language learning (F6; $MD=0.37$; $p=0.041$) and reception-based instruction (F7; $MD=1.49$; $p=0.001$), while a predominantly Hungarian or balanced bilingual teaching language supports explicit teacher-led instruction teaching (F2; $MD=-2.66$; $p=0.004$) and to a lesser extent also discovery learning (F3; $MD=1.45$; $p=0.040$). Communicative practice based on models and real-life tasks is most significantly applied in a predominantly Slovak and balanced bilingual environment (F4; $MD=0.42$; $p=0.025$).

The language used for explanations of unknown terms significantly influences the application of several teaching approaches. Explanations predominantly or exclusively in Slovak support autonomous/self-regulated learning (F1; $F(4.252)=2.98$; $p=0.020$) and reception-based approach (F7; $F(4.252)=9.18$; $p<0.001$), while explanations predominantly or exclusively in Hungarian are associated with a lower rate of their application. On the contrary, explanations in Hungarian or bilingual mode encourage explicit teacher-led instruction (F2; $H(4)=23.62$; $p<0.001$) and to a lesser extent also Discovery learning (F3; $F(4.252)=2.56$; $p=0.039$) and input-based language instruction (F5; $H(4)=10.66$; $p=0.031$). The differences are statistically significant.

3.3.5. Teachers' Knowledge of a Foreign Language

The teachers' knowledge of a foreign language is reflected in the degree to which they apply reception-based instruction (F7), with higher average values recorded for teachers who speak Russian compared to teachers who do not communicate in a foreign language, or who speak mainly English ($F(4.252)=2.57$; $p=0.038$).

3.3.6. Digital Tools in the Classroom

The impact of the use of digital tools on the choice of teaching methods was verified using linear regression analysis. Special attention was paid to explicit teacher-led instruction (F2), characterized by an emphasis on frontal explanations, systematic explanation of the subject matter, and controlled mediation of knowledge by the teacher, as well as to reception-based instruction (F7).

The results indicate that the use of digital tools has only a limited, but statistically significant relationship with explicit teacher-led instruction (F2). More frequent use of digital aids is associated with a lower rate of application of this approach ($\beta=-0.14$; $t=-2.24$; $p=0.026$), with the model explaining approximately 2% of the variability of the observed method ($R^2=0.019$; $F(1,255)=5.02$; $p=0.026$).

On the contrary, reception-based instruction (F7), which emphasizes reception, processing, and interpretation of information by students, showed a clearly positive association with the use of digital tools. A higher frequency of their use predicts a more intensive application of the approach ($\beta=0.27$; $t=4.47$; $p<0.001$), while the model in this case explains approximately 7% of the variability of this teaching strategy ($R^2=0.073$; $F(1,255)=19.97$; $p<0.001$).

3.4. Other Determinants Influencing Decision-Making when Choosing Teaching Approaches in Slovak Language and Slovak Literature Lessons

In the following section, research question (4) is addressed, which examines what other determinants influence teachers' decision-making when choosing teaching approaches in Slovak language and Slovak literature classes. To this end, the research instrument also examined teachers' use of the Slovak language outside the school context. This construct was operationalised through two variables: one capturing the practical-behavioural dimension of language use (i.e., teachers' actual, spontaneous, and situationally conditioned language practices), and the other reflecting the motivational-affective dimension (i.e., teachers' conscious, value-based, and motivational attitudes towards Slovak as a social and professional resource). The practical-behavioural aspect was conceptualised as teachers' everyday use of Slovak outside of school, while the motivational-affective aspect is understood as teachers' motivation and career orientation toward using Slovak. Linear regression analysis showed that their everyday use of Slovak outside of school is a statistically significant predictor of supporting autonomous/self-regulated learning (F1). The higher rate of use of Slovak outside of school declared by teachers is therefore associated with more frequent use of this teaching approach ($\beta=0.247$; $t=4.07$; $p<0.001$).

On the contrary, teachers' motivation and career orientation towards using Slovak was not confirmed as a significant predictor ($\beta=0.074$; $p=0.222$). The overall model is statistically significant ($F(2.254)=9.05$; $p<0.001$), but explains only a small part of the variability of the dependent variable (Adjusted $R^2=0.059$).

A higher level of explicit teacher-led instruction (F2) is associated with higher motivation and career orientation of the teachers to use Slovak ($\beta=0.230$; $t=3.78$; $p<0.001$). The regression model as a whole is statistically significant ($F(2.254)=7.81$; $p=0.001$), explaining approximately 5% of the variability of the dependent variable (Adjusted $R^2=0.050$).

The regression model indicates that both extracurricular factors are related to the degree of application of discovery learning (F3). Teachers' daily use of Slovak outside of school appears to be a stronger predictor of this approach ($\beta=0.221$; $t=3.66$; $p<0.001$), while a positive relationship was also confirmed for motivation and career orientation towards the use of Slovak (F2; $\beta=0.155$; $t=2.56$; $p=0.011$). The model as a whole reaches statistical significance ($F(2.254)=9.98$; $p<0.001$) and explains approximately 7% of the variability in the use of discovery learning (Adjusted $R^2=0.066$). Discovery learning is linked to both authentic language use and conscious motivation.

The use of a communicative practice based on models and authentic tasks (F4) is primarily related to teachers' declared practical everyday use of Slovak outside of school. This factor appears to be a significant positive predictor ($\beta=0.218$; $t=3.58$; $p<0.001$). The model as a whole reaches statistical significance ($F(2.254)=7.41$; $p=0.001$), explaining approximately 5% of the variability of the dependent variable (Adjusted $R^2=0.048$).

The regression model indicates that the level of use of input-based language instruction (F5) is conditioned by the presence of both out-of-school factors. Teachers' declared practical everyday use of Slovak outside of school appears as a stronger positive predictor ($\beta=0.234$; $t=3.87$; $p<0.001$), while their motivational-career orientation towards the use of Slovak has a weaker, but still statistically significant influence ($\beta=0.122$; $t=2.02$; $p=0.044$) on the level of implementation of input-based language instruction. The model as a whole reaches statistical significance ($F(2.254)=9.52$; $p<0.001$) and explains approximately 6% of the variability of the dependent variable (Adjusted $R^2=0.062$).

Active communicative language learning (F6) is to a limited extent associated with teachers' declared higher level of use of Slovak outside of school. A statistically significant, although weak positive relationship is observed exclusively in the practical everyday use of Slovak outside school ($\beta=0.163$; $t=2.63$; $p=0.009$).

The model as a whole achieves statistical significance ($F(2.254)=3.45$; $p=0.033$), but explains only a small part of the variability of the observed factor (Adjusted $R^2=0.019$).

The application of reception-oriented teaching (F7) is primarily related to the intensity of practical everyday use of Slovak outside school declared by teachers. This factor appears to be a significant positive predictor ($\beta=0.263$; $t=4.34$; $p<0.001$). The overall model is statistically significant ($F(2.254)=9.57$; $p<0.001$) and explains approximately 6% of the variability of the dependent variable (Adjusted $R^2=0.063$).

Teachers also expressed their attitudes towards the difficulties they perceive in their students during teaching Slovak in the areas of production, and linguistic (linguistic accuracy), receptive, phonetic and perceptual competence. Multiple linear regression indicates that the language difficulties of students perceived by teachers are differentially linked to the application of explicit teacher-led instruction (F2). Among the analysed dimensions of perceived language difficulties, phonetic and perceptual competence—specifically difficulties related to pronunciation and understanding instructions—emerged as a statistically significant predictor ($\beta=0.192$, $t=2.31$, $p=0.022$). By contrast, other domains of language difficulty, including productive competence, linguistic accuracy, and receptive competence, did not show a statistically significant effect in the model ($p > 0.05$). The overall model is statistically significant ($F(4.252)=7.95$; $p<0.001$) and explains approximately 10% of the variability in the use of explicit teacher-led instruction (Adjusted $R^2=0.098$).

The regression model shows that the use of reception-based instruction (F7) is mainly related to the perceived difficulties of students in the area of receptive activities. Problems with understanding spoken and written text appear as a significant negative predictor ($\beta=-0.272$; $t=-3.01$; $p=0.003$), which indicates that with a higher level of these difficulties, teachers use the reception-based instruction less often. The model as a whole is statistically significant ($F(4.252)=5.40$; $p<0.001$) and explains approximately 6% of the variability in the observed approach (Adjusted $R^2=0.064$).

3.5. Model of Determinants of Adaptive Application of Teaching Approaches

Based on the combination of the results of variance analyses, non-parametric tests and regression models, key determinants were identified that systematically regulate the level of application of individual teaching approaches.

Their summary effect is captured and schematically illustrated in the adaptive teaching regulatory model (ABDRM) (Figure 1).

Based on the results, a regulatory model of teaching Slovak as an L2 in a minority school environment was created.

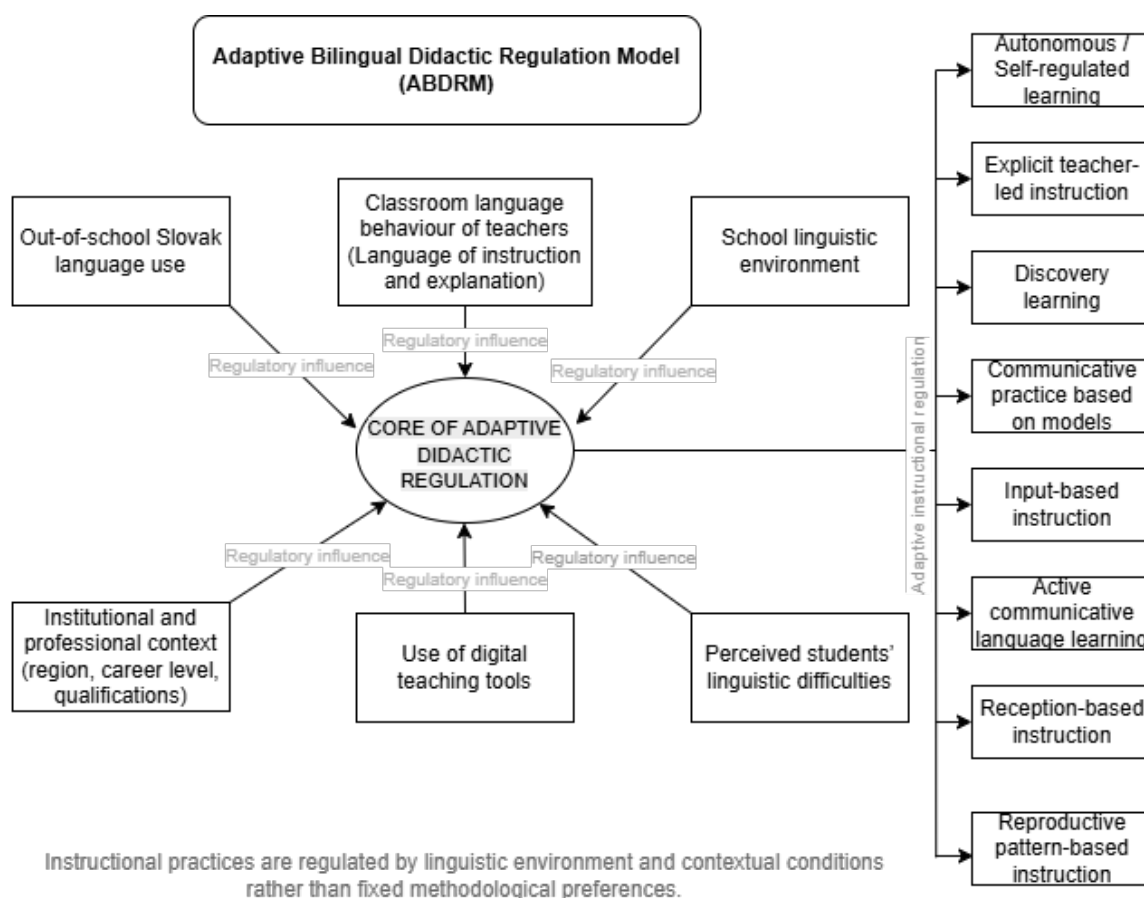


Figure 1. Model of adaptive regulation of teaching approaches in a bilingual school environment

4. Discussion

The aim of the study was to analyse how selected individual, linguistic, professional and contextual factors are reflected in teachers' didactic decisions and the application of different teaching approaches in a specific minority environment in majority language classes. The results confirm that pedagogical practice is the result of a complex interaction of teachers' beliefs, linguistic resources, professional experience, and wider institutional and regional conditions, which is in line with the concept of teacher thinking as a dynamic and context-dependent system [11].

One of the main findings is the lower rate of application of approaches supporting high student autonomy and self-regulation compared to teacher-led and input-oriented forms of teaching. This discrepancy between declared preferences for modern, learner-centred approaches and their limited implementation in practice corresponds with previous research pointing to the tension between teachers' beliefs and their actual actions in the classroom [12], [13].

Regression analyses further refine this discrepancy by showing that the support for self-regulated learning is not significantly conditioned by teachers' declared motivation or career orientation to use the majority language, but primarily by its authentic, everyday use outside the school environment. This result suggests that autonomous and self-regulatory strategies are tied to teachers' implicit linguistic confidence and internalized experience rather than their conscious professional intentions, which is in line with the distinction between teachers' explicit beliefs and tacit knowledge [11].

It has also been shown that didactic decision-making is differentiated at the regional level. Differences between regions in the application of explicit teacher-led, active communicative, and reception-based instruction point to the influence of regional pedagogical cultures, resource availability and institutional expectations. These findings confirm that adaptive teaching cannot be understood exclusively as an individual teacher competence, but also as a result of systemic and geographically conditioned factors [17].

At the same time, regression models indicate that even individual teachers' linguistic resources are applied within these broader contexts with only limited explanatory power, which confirms the importance of a multi-level view of pedagogical decision-making.

The career level of the teacher also appeared to be an important differentiating factor. The results indicate a developmental shift from explicit-interpretive teaching in independent teachers to a broader spectrum of discovery, communication, movement-based, and receptive approaches in teachers with a higher level of professional qualification. This trend supports the claim that pedagogical decision-making is reflexive and subject to development over time [16]. Regression findings further concretize this developmental aspect by showing that explicit teacher-led instruction is positively associated with teachers' career orientation towards using the majority language, suggesting that language may be perceived as an object of professionalization and control, especially in earlier or formally oriented phases of the professional career. From the perspective of adaptive teaching [20], career growth can be seen as a process of expanding epistemic tools and strategic flexibility that allow teachers to transcend rigid methodological frameworks.

The analysis of the school language environment yielded particularly significant findings. The highest rates of autonomous/self-regulated learning, discovery learning, and communicatively oriented approaches were recorded in schools with a balanced use of minority and majority languages. This result suggests that a balanced bilingual environment may create more favourable conditions for the application of autonomous and open pedagogical strategies than linguistically asymmetric contexts. Regression analyses support this conclusion by showing that Discovery learning and communicatively oriented approaches are systematically linked to teachers' authentic language practices, and not just to their formal language orientation. Thus, the school language environment can be understood as a stabilizing contextual factor that allows teachers' implicit language resources to be translated into adaptive didactic decisions [11].

In a specific minority setting, the language of instruction in majority language classes has been shown to statistically significantly differentiate the application of several teaching approaches. Predominantly or exclusively using the majority language, including the language of explanation of unknown terms, is associated with higher levels of autonomous and self-regulated learning, active communicative language learning and reception-based instruction, while predominantly minority or balanced bilingualism supports explicit teacher-led instruction and, to a lesser extent, discovery learning.

Regression models also show that input-based language instruction is conditioned by a combination of authentic use of the majority language and conscious language orientation of teachers, which suggests the hybrid nature of this approach. In line with [14], it can be stated that teachers' language choices mediate the relationship between their beliefs, language confidence and specific teaching strategies.

The linguistic aspect is also closely related to the language aspect of teachers' linguistic competence. The higher level of application of reception-based instruction among teachers with a wider language repertoire suggests that foreign language learning experience may strengthen an epistemological orientation towards understanding, interpretation and processing of meaning. Regression analyses deepen this relationship by confirming a strong link between reception-based instruction and everyday use of the majority language outside of school, while perceived receptive difficulties of students tend to weaken this approach. This adaptive paradox suggests that teachers in situations of increased language risk tend to limit the very strategies that could support the development of understanding, which corresponds to the tension between pedagogical ideals and situational constraints [12], [13].

Reception-based instruction also appeared to be closely linked to the use of digital teaching aids, which points to a synergistic effect between technological resources and cognitively oriented forms of learning. This result is in line with research on adaptive teaching, which emphasizes the importance of diagnostic information, multimodal stimuli and flexible real-time learning support [17], [18]. Digital tools in this context do not appear as innovations in themselves, but as means to enable teachers to respond to linguistic diversity and heterogeneous needs of students.

In summary, it can be stated that the use of teaching approaches, methods, and the application of various strategies are conditioned by a combination of teachers' language behaviour outside of school, their attitudes towards the use of Slovak, the perceived language difficulties of students, and the didactic background of teaching. Practical everyday use of Slovak outside of school appears to be the most stable and consistent positive predictor across multiple teaching approaches, which points to the importance of teachers' authentic language contact for methodological decision-making. Motivational-career orientation to the use of Slovak is applied selectively, especially in explicit-interpretive and input-oriented teaching, where it strengthens the systematic mediation of language content. At the same time, it appears that a higher rate of receptive language difficulties in students is associated with a lower rate of application of a receptively oriented approach, which indicates an adaptive didactic response of teachers to students' limited understanding.

The use of digital tools also fits into this pattern, which is associated with the weakening of explicit teacher-led, but at the same time supports reception-based instruction, thus indicating a shift towards visually and input-supported forms of teaching.

The input determinants of the regulation of selected profile configurations of teaching approaches are the extracurricular language contact of teachers, the language of teaching and explanation, the perceived language difficulties of students, the institutional-professional context, and the digital environment.

5. Conclusion

Based on the presented results, several key conclusions can be formulated about the nature of adaptive didactic decision-making in Hungarian-medium primary schools in Slovakia. The findings indicate that teachers do not respond methodically randomly, but rather systematically to the language environment in which they find themselves, to their own language practice, to the perceived difficulties of students, to the digital environment, as well as to their professional career. The summary of the data shows a complete mechanism of adaptive decision-making. This empirical model of adaptive didactic regulation in minority bilingual education identifies clear goals for further research. It is important to mention that when teaching (not only) languages, individual methods are not taken into account, but complex strategies that are determined by a wide range of circumstances and various aspects. Teaching Slovak as L2 in primary schools with Hungarian as the language of instruction in Slovakia cannot be understood as a static choice of preferred methods, but as an adaptive regulatory system in which teachers continuously modulate their didactic decisions depending on the linguistic, student, and institutional conditions. The central element of this model is the adaptive didactic regulatory core, i.e., the dynamic decision-making mechanism of teachers, through which the input conditions of the environment are evaluated in real time and specific teaching strategies are regulated. However, the extent to which Slovak is used outside of school, along with the motivation in relation to this language, consistently influences the decision-making among the teachers within the research sample. This fact may result from the low level of self-confidence of the teachers due to insufficient practice of Slovak, but also from the level of their functional competence in the target language.

When interpreting the results, it is also necessary to take into account several methodological and contextual limitations that may affect their transferability to other school environments. The research design is cross-sectional and based on teacher self-assessment, therefore, causality cannot be inferred or real classroom behaviour verified.

Several factors contain only two items, which naturally reduces the reliability of the questionnaire; for these dimensions, we consider it appropriate to supplement the items and re-verify the entire questionnaire so that it can serve as a standardized test for mapping pedagogical approaches. The reliability of post hoc comparisons is affected by small groups of the research sample, which reduces the stability of the estimates. In the regression models, the explained proportions of variability are low, which points to uncaptured factors influencing teachers' decision-making.

Acknowledgements

The research was carried out thanks to financial support from the Recovery and Resilience Plan of the Slovak Republic - Funded by the European Union NextGenerationEu within the project Slovak as a Second Language in Pre-Graduate Teacher Training. Abbreviation of the project SLOV2LIN; Project code: 06R02-20-V01-00001.

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