



## USING KOLB'S LEARNING MODEL IN STRUCTURED TYPES OF PROFESSIONAL EDUCATION AND TRAINING FOR TEACHERS

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### Abstract/Izvlaček

The use of Kolb's model enhances the effects of professional development because the model allows the exchange of concrete experience, reflective observation, abstract conceptualisation and active experimentation, and provides the connection between theory and practice. The empirical part of this paper analyses the results of a survey conducted among teachers from Croatian primary schools regarding the presence of the four stages of Kolb's learning model in structured types of professional education and training. The survey shows teachers' dissatisfaction regarding the presence of activities such as reflection on teaching, linking theory to practice and stimulating research activities in teaching practice.

**Uporaba Kolbovega modela učenja v organiziranih oblikah strokovnega izpopolnjevanja učiteljev** Uporaba Kolbovega modela izboljšuje rezultate profesionalnega dela in izpopolnjevanja, saj model ponuja priložnost za izmenjavo konkretnih izkušenj, refleksivnega opazovanja, abstraktnega razmišljanja in aktivnega eksperimentiranja ter omogoča povezavo med teorijo in prakso. V empiričnem delu prispevka smo analizirali rezultate ankete med učitelji in hrvaških osnovnih šol o prisotnosti štirih faz učnega procesa po Kolbovem modelu v organiziranih oblikah strokovnega izpopolnjevanja. Raziskava je pokazala nezadovoljstvo učiteljev s strokovnim izpopolnjevanjem v smislu dejavnosti refleksije o poučevanju, povezovanja teorije s praktičnim delom in spodbujanja raziskovalnih dejavnosti v učiteljski praksi.

### Keywords:

lifelong learning, Kolb's learning model, structured types of learning, professional education and training, teachers.

### Ključne besede:

vseživljenjsko izobraževanje, Kolbov model, organizirane oblike učenja, strokovno izpopolnjevanje, učitelji.

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## Introduction

No course of initial teacher education can equip teachers with all the knowledge and competences they will require during their work in an educational institution (Tatković, Močinić, 2012; Tatković, Čatić, 2010). Therefore, professional education and training, as integral parts of lifelong learning, are indispensable for navigating the modern-day society characterized by rapid and continuous changes on both the national and international level. Currently, nothing can replace professional education and training. It is a necessity, because it brings benefits not only for an individual, but also for the society as a whole. Educators can access a broad range of types, methods and procedures for professional improvement only through constant training and education, which need to be continuously encouraged at the level of the educational institution and the Ministry of Education (Tatković, 2016). Research has shown that professional education and training should be systematic and planned, as well as aligned with the development needs of all staff members. There is a need for a paradigm shift from the traditional approach to initial training and professional development to a model of continuous professional education and training through the implementation of modern forms of training such as e-learning and various other advantages offered by information and communications technology. That would allow professional education and training to take place “anywhere and anytime”, reducing the amount of time and necessary expense, improving organization and increasing the forms and quality of professional education and training (Tatković, 2016). In this sense, motivation plays an extremely important role, both for participation in professional education and training and persistence in achieving the set objectives, as well as for learning outcomes (Lepičnik Vodopivec, 2018, Javornik Krečić, Konečnik Kotnik, 2011), because human resources are the strongest asset of the current professional education and training system. Without autonomy and personal professional responsibility, only the formal requirements are met, but there is no quality of knowledge, ability and skills.

Furthermore, research has also shown that professional education and training and development of competences is an important motivating factor from the perspective of improving one's personal reputation, building a positive self-image and advancement opportunities, and increasing the quality of work with children (Tatković, 2016), as well as pursuing one's own personal interests (Lepičnik – Vodopivec, 2018), which is why educators have high expectations from professional education and training (Hmelak 2012, Hmelak, Lepičnik Vodopivec, 2013).

While seeking better options and changes in the professional education and training system, which do not occur simultaneously with social change, everyone should be given equal lifelong learning opportunities, i.e. professional development and personal advancement opportunities, so that they can assume the new roles required by the knowledge society (Tatković, Močinić, 2012). It is a known fact that well thought out and efficiently organised professional education and training allow not only professional development of teachers, but their academic advancement as well, thus contributing to the improved quality of work of the educational institution where they work. Therefore, to establish a more efficient professional education and training system, it is advisable to follow and implement EU recommendations and objectives (OECD, 2009):

- to update individuals' knowledge of the teaching subject as part of improvement in a given area;
- to update individuals' skills, attitudes and objectives in line with the new research results in the field of education;
- to allow individuals to introduce changes to curricula or other aspects of teaching practice;
- to allow schools to develop and implement new strategies related to the curriculum and other aspects of teaching practice;
- to exchange information and expert knowledge among teachers and other stakeholders, such as academics, experts in specific areas, etc.;
- to help less successful teachers become more effective.

Change is the agent of development or the continuation of well-started reform. It is important to know how to deal with change, but efficient change management requires not only a high level of personal motivation but also support from everyone affected by the change (Potts, 2005).

Research studies in this area have shown that many types of teacher professional development are insufficiently effective in supporting changes in teaching practice and student progress (Darling-Hammond, Hyler, Gardner, 2017; Bilač, Tavas, 2011; Strugar, 2012). Darling-Hammond, Hyler and Gardner believe that high-quality professional development needs to do the following: a) focus on the content of the curriculum; b) involve active learning; c) foster cooperation among participants; d) use practical examples of good practice; e) provide professional support focused on individual needs of participants; f) provide feedback and encourage reflection on one's own teaching practice; g) ensure sufficient time for studying, practising, reflecting and implementing new strategies and other changes in one's teaching practice (Darling-Hammond, Hyler, Gardner, 2017).

*Implementation of professional education and training of teachers in the Republic of Croatia*

In the Republic of Croatia, professional education and training of teachers is implemented on the individual, school, county and national levels. All further considerations presented in this paper refer only to the county and national levels of professional education and training because the individual and school levels are much too varied and therefore difficult to examine systematically. High-quality professional education and training courses on the national and county levels usually combine plenary lectures during conferences attended by a large number of participants and small-group work during workshops and projects, in learning communities, through various forms of experiential learning, via video-conferences, webinars and active participation in seminars, lectures, conferences, round tables, debates, study visits and participation in online forums (Petljak Zekić et al., 2013: 10; AZOO, 2014). Traditional types of professional education and training completely neglected practical exercises and presentation of examples of good practice (Tatković, 2016). Apart from short theoretical lectures, modern forms of professional education and training usually consist of workshop-type activities, which allows active participation of teachers and improves communication through the exchange of successful practical experience and good practices.

Since the academic year 2008/2009, modular professional education and training has been implemented in Zagreb County, involving quite small groups of teachers and based on the principle of participation in a given topic, which is analysed in the course of three meetings, i.e. modules (Petljak Zekić et al., 2013: 14).

The first module begins with a theoretical background, the second module involves practical exercises (workshops), while the third module is reserved for the demonstration of practical examples and an exchange of experiences among participants.

A learning community is another form of professional education and training, during which teachers meet to exchange their teaching experiences and learn from one another how to improve their teaching practice (Tatković, 2016). The participants are required to describe their everyday classroom teaching experiences in relation to research insights related to child development, learning and teaching theories, and similar. In doing so, teachers need to be ready to critically revise their personal knowledge and convictions, to be open and flexible towards other people's opinions, to be willing to undergo an in-depth analysis of reasons on which their approach to education is based, to have highly developed communication competence, and to know how to apply the maieutic method of systematic examining of all aspects of the analysed experience (Mortari, 2011: 112-113).

Strugar (2012: 108) expressed strong criticism of the manner in which topics of professional conferences in Croatia are planned, during which the needs of teachers and projects that are being introduced in the school system are not taken into consideration, and where the topic titles are usually defined on the basis of the affinity of the invited speakers. His criticism probably refers to the traditional concept of professional education and training, which was mostly implemented in the form of lectures, seminars, professional conferences and presentations for a large number of teachers (Petljak Zekić et al., 2013: 12).

Gradually, however, a new concept of professional development of teachers is being introduced, in which a teacher is an active and reflective practitioner and researcher of his/her teaching practice. Thus, numerous research studies have shown that reflection and discussion with other teachers about their experiences related to the pursuits of a modern school foster professional development better than reading books or attending lectures (Bognar, B. 2011).

A thorough examination of the relevant literature clearly shows that traditional forms of professional education and training, whose purpose is to disseminate instructions about how teaching should be organized on the basis of someone else's guidelines and examples, without active reflection about them, have still not been abandoned.

Some studies show that the frequency of organizing professional training can contribute to improving the quality of teaching (Javornik Krečić et al., 2015). However, the traditional form of professional training and development combined with the large number of participants at the county and state levels makes it difficult for teachers to actively participate in pedagogical workshops and other forms of communication.

Furthermore, useful practical experiences are insufficiently presented in professional conferences and in national and foreign journals. A possible reason for this is that teachers receive insufficient material, emotional and professional support in their school environments to share their education solutions and experiences with others. For this reason, numerous valuable experiences of practitioners remain unknown to a broader pedagogical public (Laneve, 2009). Moreover, there is no basis for building the learning community and learning organization characterised by joint learning, critical questioning and generalization of experiences, continuous development of one's own potential, openness towards cooperation and new forms of coexistence, equal participation in tasks and obligations, and common values of freedom, autonomy and respect (Tatković, N., 2016, Slunjski, 2006, Senge 2003). A learning community refers to a group of people who share common interests and problems and who are building their knowledge and skills in a given area through constant mutual cooperation and communication (Wenger, McDermott, Snyder, 2002, according to Bognar, 2009). We are aware of the fact that active experimentation was not feasible in the traditional model of professional education and training because large numbers of teachers attended professional conferences and plenary lectures which did not require them to actively participate in the work. Hence, in modern models of professional education and training, there is no room for the outdated forms of work. Instead, active involvement of teacher-practitioners is necessary, as well as simulations of educational situations and other forms of experimentation. In order to be competent, teacher-practitioners need to possess three types of knowledge: theoretical knowledge (academic, higher-education knowledge and research results aimed at improving teaching practice); professional knowledge (knowledge acquired through teaching), and practical knowledge (knowledge stemming from reflection on one's own experience) (Meyer, 2002: 186).

## **Research methodology**

### *Introduction to empirical research*

The starting point for this research is the experiential learning model (Kolb, 1984), which is implemented through four stages: concrete experience, reflective observation, abstract conceptualisation, and active experimentation and which, in the author's opinion, ensures an in-depth approach to learning and understanding of the connection between theoretical concepts and specific practical issues, as well as the development of competences that allow one to integrate declarative, procedural and meta-cognitive knowledge. Kolb and Fry (1975) claim that the learning cycle can begin at any of the four stages, and that the learning process should be approached as a continuous spiral development. Additionally, all four stages of the process need to occur in order for learning to actually take place.

Hence, the construction of our measurement instruments stemmed from Kolb's experiential learning model, which we applied to the professional education and training of teachers. For the purpose of this research, the following pedagogical/didactic meanings were attributed to Kolb's psychological model: *concrete experience* refers to the observation of teaching or personal delivery of a teaching unit; *reflective observation* includes reflection on someone else's or one's own practical activity by examining a pedagogical situation from various perspectives; *abstract conceptualisation* refers to the logical analysis of experience, identification of behaviour patterns, connection with theoretical knowledge, planning and forecasting on the basis of what has been observed; and *active experimentation* refers to the validation of conclusions drawn from a new pedagogical situation (Vizek Vidović, editor, 2005: 294-295). Each measurement instrument includes a theoretical construct related to the previously acquired knowledge as the basis for further learning and development of teacher competences through various types of structured professional education and training.

Owing to a lack and unavailability of original instruments to meet the needs of this research, an entirely new instrument has been created, adapted to the objectives of this research. We created a questionnaire for the area of professional education and training of teachers, containing 84 items. The items were developed and grouped into scales in accordance with Kolb's theoretical model of experiential learning.

Each questionnaire contained the following scales:

1. the *knowledge acquisition* scale, which refers to the acquisition of theoretical knowledge as the basis for further learning and which is not part of Kolb's experiential learning cycle;
2. the *concrete experience* scale, which assesses personal experience of observing, planning and implementation of teaching;
3. the *reflective observation* scale, which refers to reflection during and after one's own lesson delivery or after having seen someone else deliver a lesson, i.e. videos showing examples of good practice;
4. the *abstract conceptualisation* scale, which includes items used for the assessment of logical analysis and explanation of various pedagogical situations, connection with theoretical knowledge and anticipation of innovations on the basis of the acquired knowledge and insights;
5. the *active experimentation* scale, which contains items used in assessing the use of the acquired knowledge and insights in a new pedagogical situation.

Using the five-point Likert scale (in which 1 stands for "not at all", and 5 stands for "completely"), the respondents were asked to assess the extent to which each stage of Kolb's experiential learning model was present in the scales provided. Each instrument was tested for satisfactory metric characteristics. Sensitivity was tested by means of dispersion measures, and the construct validity was tested by means of factor analysis, while reliability was tested by the internal consistency method – Cronbach's alpha. Internal consistency coefficients (Cronbach's alpha) obtained for each of these scales were rather high, ranging between 0.803 and 0.955.

#### *Research procedure*

For the purpose of conducting a survey among teachers, some of the questionnaires were personally distributed in primary schools in the city of Pula, while others were sent via mail to the towns of Rovinj, Poreč, Umag and Buje. We approached the principals, asking for their approval; some of them gladly agreed to cooperate, while others excused their teachers on account of numerous other obligations. The response rate among lower-year teachers in schools whose headmasters agreed to cooperate was not satisfactory, which could be explained by a multitude of reasons, including the complexity and length of the questionnaire, insufficient interest, lack of time, etc.

*Teacher Sample*

Table 1: The number of respondents who completed the questionnaire regarding professional education and training of teachers.

Measurement instrument	Qualification level					Total
	1 <sup>st</sup> to 4 <sup>th</sup> year teachers with a university degree	Teachers with a university degree, specialized in teaching a specific subject	Master of primary education	Other (teachers teaching specific subjects, etc.)		
Professional education and training of teachers questionnaire	78	15	6	7	106	
	A school year in which the teacher works					
	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year	Subject teacher	Total teacher
	24	28	21	24	9	106

The study involved a total of 106 teachers of lower grades of primary schools (grades 1 to 4) from Pula, Rovinj, Poreč, Umag and Buje in Istria County; 99 of them were female and only 6 were male, while one respondent did not specify his/her answer regarding this demographic variable. The largest number of respondents were 1<sup>st</sup> to 4<sup>th</sup> year teachers (6<sup>th</sup> and 7<sup>th</sup> education level), making up 73.6% of the overall sample; a considerably smaller number of teachers with a university degree specialized in teaching a specific subject (7<sup>th</sup> level), while there were very few masters of primary education (7<sup>th</sup> level), and none with a master's or doctoral degree in science (Table 1).

From the total number of respondents (N=106), the majority were second-grade teachers (N=28); there was an equal representation of the first- and fourth-grade teachers (N=24); and the lowest number of respondents were third-grade teachers (N=21). Also, 9 subject teachers participated in the research, i.e. foreign language teachers or native language teachers.

*Data processing methods and procedures*

The research was based on quantitative and qualitative methodology, with specific data processing methods and procedures that will be described later.

To analyse teachers' opinions, the authors used the descriptive research method of pedagogical research (Mužić, 2004), combined with survey and opinion assessment, as well as parallel data analysis.

Data processing was conducted by means of the SPSS 18.0 programme for statistical analysis. Considering the fundamental experiential learning model and the additional aspect of the necessary basic knowledge, we conducted analyses of the basic stages of the model using groups of items that define the content of each aspect of experiential learning (constructs: knowledge acquisition, concrete experience, reflective observation, abstract conceptualisation, active experimentation).

### **Results of the survey on teacher opinions regarding their professional improvement**

The factor analysis that was conducted shows that *knowledge acquisition* in the context of professional education and training of teachers is a multi-dimensional construct. Two factors whose characteristic roots were greater than 1 were singled out (characteristic root for the two singled-out factors: 11.347, 1.878), which explain a total of 60.115% of the scale outcome variance. Considering the size of the coefficient in the pattern matrix shown in Table 2, the first factor was called Familiarity with Developmental Characteristics of Students and Classroom Management (items 1 to 11), while the second was called Familiarity with Didactic/Methodological Aspect of Teaching (items 12 to 22). On the basis of the factor analysis, two eponymous sub-scales were constructed.

The highest values ( $M=3.22$ ) were attributed to the Familiarity with Developmental Characteristics of Students and Classroom Management sub-scale (Table 2), while the lowest standard dispersion ( $SD=.97$ ) was observed for the item Defining the Possibility of Individualization and Personalization. The lowest arithmetic mean ( $M=2.61$ ) was observed for the item Defining Strategies for Effective Inclusion of Gifted Students in the Education Process. The item Describing Manners of Classroom Management and Maintaining Classroom Discipline exhibited the highest standard dispersion of results ( $SD=1.24$ ).

Table 2: Factor matrix of the *Knowledge acquisition* scale in the context of professional education and training of teachers and descriptive statistics for items on the scale.

Acquisition of knowledge in the context of professional education and training of teachers	Factor*		M	SD
	1	2		
1. Defining criteria for identifying gifted and talented children	.946		2.839	1.113
2. Defining learning difficulties (dyslexia, dysgraphia, dyscalculia)	.868		3.094	1.064
3. Defining strategies for effective inclusion of gifted students in the education process	.865		2.613	1.199
4. Defining the process of emotional development of students	.748		3.103	1.059
5. Describing students with behavioural disorders (students with ADHD, aggressive students, depressive students, etc.)	.721		3.217	1.095
6. Describing techniques of classroom management and maintaining classroom discipline	.683		2.754	1.248
7. Defining the possibilities for resolving cognitive conflicts of a methodological/didactic nature during the teaching process	.681		2.886	1.053
8. Defining the process of social development of students	.638		3.141	1.090
9. Defining the possibility of individualization and personalization	.629		3.226	.978
10. Defining the terms multiple intelligences and learning styles	.580		3.047	1.115
11. Defining the process of intellectual development of students	.575		3.217	1.086
12. Defining the possibility of stimulating the development of communication skills		.781	3.641	1.025
13. Defining the possibility of using information and communications technology in teaching		.771	3.603	.922
14. Defining the basic components of cooperative learning		.770	3.311	.959
15. Defining the possibility of intra-subject and inter-subject correlation of the subject content		.763	3.877	.836
16. Defining strategies for stimulating linguistic expression and creation		.760	3.481	1.006
17. Defining strategies for enhancing reading motivation and development of reading literacy in children		.628	3.424	1.086
18. Defining planning and programming of the teaching process focused on the development of competences		.611	3.462	.852
19. Defining opportunities for adopting an active approach to learning during the teaching process		.595	3.660	.934
20. Defining partnership with parents		.549	3.245	1.093
21. Defining opportunities for stimulating critical thinking in children	.361	.538	3.509	.968
22. Describing processes and criteria for evaluating student achievements		.503	3.490	.928

Factor 1: Familiarity with developmental characteristics of students and classroom management

Factor 2: Familiarity with the didactic/methodological aspect of teaching

\* In order to facilitate interpretation, we have listed the factorial saturations whose absolute value exceeds 0.3.

Based on analysis of the results (Table 2) for the Familiarity with Didactic/Methodological Aspect of Teaching sub-scale, we observe the highest median value ( $M=3.87$ ) and the lowest standard dispersion of results ( $SD=1.01$ ) for the item Defining the possibility of intra-subject and inter-subject correlation of the subject content. The lowest median value ( $M=3.24$ ) and the highest standard dispersion of results ( $SD=1.09$ ) were identified for the item Defining Partnership with Parents.

Based on the results obtained by conducting factor and descriptive statistical analysis, it can be concluded that the acquisition of knowledge in the area of familiarity with developmental characteristics of students and classroom management is less frequently encountered than familiarity with the didactic/methodological aspect of teaching (Table 2). The difference is evident from the lower median values and higher dispersion of results in the first sub-scale in comparison to the second sub-scale. One possible reason for this might be the teachers' lack of knowledge about how to implement differentiation and personalization of teaching. Recently, there has been growing demand for differentiation and personalization in the education process, owing to increased awareness about significant differences in students' abilities, learning styles, social background, previously acquired knowledge, attitudes and beliefs. Such a demand, however, justifiably challenges the campaign for standardization of education (Cindrić et al., 2010: 234; Strugar, 2012: 114), which opposes the cultivation of unique talents and development of both general and specific competences in students.

Furthermore, teachers recognize a lack of classroom management knowledge, probably due to an outdated approach to maintenance of discipline that they adopted during their studies or in the course of their own teaching practice. According to the German author Bueb (2007: 48-49), in the past, students had a moral obligation to demonstrate submission to authority, while in post-modern society, the legitimacy of a teacher's authority needs to be based on dialogue and recognition of affective and emotional influences on the interpersonal relationships that are forged in the classroom. Therefore, in the past forty years, the approach to maintaining discipline in the classroom has changed, which is further confirmed by the introduction of the term *classroom management*, which has replaced the former concept of maintenance of discipline (D'Alonzo, 2004: 10-11).

The new term is much broader, encompassing the entire organization of work in the classroom and involving numerous factors, including a motivating atmosphere sensitive to the needs of each student, interesting teaching content, active participation of students and their cooperation with teachers, dynamic teaching methods, interesting course materials, sufficient time for learning and a careful selection of conflict resolution procedures (Castoldi et al., 2007: 157-160).

Table 3: Factorial matrix of the *concrete experience* scale in the context of professional education and training of teachers and descriptive statistics of items on the scale

Concrete experience in the context of professional education and training of teachers	Factor* 1	M	SD
1. Developing units of learning outcomes in the Science curriculum	.886	3.087	1.221
2. Developing units of learning outcomes in the Mathematics curriculum	.876	3.087	1.213
3. Developing units of learning outcomes in the Croatian language curriculum	.867	3.068	1.254
4. Analysis of concrete barriers to learning (insufficient prior knowledge, lack of effective learning strategies, etc.)	.860	2.786	1.072
5. Finding solutions to difficulties, problems and obstacles in various teaching situations	.823	2.990	1.158
6. Analysis of the partnership building process between the school and the family	.822	3.213	1.081
7. Analysis of the possibility to adapt teaching to different learning styles and needs of students in a concrete teaching situation	.792	2.708	1.134
8. Analysis and assessment of objective-type assignments	.785	3.291	1.090
9. Developing criteria for assessing student achievements on several levels in a given subject area	.784	3.271	1.077
10. Analysis of different learning styles and individual needs of students	.763	3.310	.980
11. Analysis of the process for resolving concrete teaching situations	.760	2.912	1.067
12. Analysis and assessment of students' written assignments (essay questions)	.733	3.019	1.084
13. Stimulating children's fantasy and creativity in expressing emotions, moods and ideas	.705	3.572	.996
Factor 1: Experience in using didactic/methodological knowledge and insights in teaching			

\* In order to facilitate interpretation, we have listed factorial saturations whose absolute value exceeds 0.3.

The factor analysis shows that *concrete experience* in the context of professional education and training of teachers is a one-dimensional construct. We have singled out one factor whose characteristic root is greater than 1 (characteristic root for the factor: 8.451), which explains a total of 65.006% of the scale outcome variance.

In the pattern matrix shown in Table 3, this factor was called Experience with Using Didactic/Methodological Knowledge and Insights in Teaching (items 1 to 13). On the basis of the factor analysis, an eponymous scale was constructed.

On the basis of the analysis of the results (Table 3), the highest median value ( $M=3.57$ ) on the Experience with Using Didactic/Methodological Knowledge and Insights in Teaching scale was observed for the item Stimulating Children's Fantasy and Creativity in Expressing Emotions and Ideas, while the lowest median value ( $M=2.70$ ) was observed for the item Analysis of the Possibility to Adapt Teaching to Different Learning Styles and Needs of Students in a Concrete Teaching Situation. The highest standard dispersion of results ( $SD=1.25$ ) was observed for the item Development of Units of Learning Outcomes in the Croatian Language Curriculum, while the lowest standard dispersion was observed for the item Analysis of Different Learning Styles and Individual Needs of Students.

Results of the factor analysis and descriptive analysis seem to indicate insufficient *concrete experience* with structured professional education and training of teachers. Strugar (2012: 108) strongly criticised the planning of professional conference topics, during which the needs of teachers and projects that are being introduced into the education system are not taken into consideration; instead, the topics are usually selected on the basis of affinities of invited speakers. His criticism probably refers to the traditional concept of professional education and training, which was mostly implemented in the form of lectures, seminars, professional conferences and presentations for a large number of teachers (Petljak Zekić et al., 2013: 12).

The factor analysis shows that *reflexive observation* in the context of professional education and training of teachers is a one-dimensional construct. We singled out one factor whose characteristic root is greater than 1 (characteristic root for the factor: 8.348), which explains a total of 59.632% of the scale outcome variance. In the pattern matrix shown in Table 4, this factor was called Reflection on Teaching Practice in the Light of Psychological, Pedagogical and Didactic Insights (items 1 to 14). On the basis of the factor analysis, an eponymous scale was constructed.

On the scale Reflection on the Teaching Practice in the Light of Psychological, Pedagogical and Didactic Knowledge and Insights (Table 4), respondents awarded the highest values ( $M=3.45$ ) to the item called Analysis of School Documentation, while the lowest median value ( $M=2.35$ ) was observed for the item called Explaining Personal Difficulties Related to Teaching.

Table 4: Factorial matrix of the *reflective observation* scale in the context of professional education and training of teachers and descriptive statistics for items on the scale.

Reflective observation in the context of professional education and training of teachers	Factor* 1	M	SD
1. Explaining personal methodological mistakes in the delivery of classes	.849	2.528	1.180
2. Analysis of an educational show or a children's magazine	.821	2.452	1.196
3. Describing one's actual practical experience and linking it with psychological and pedagogical theoretical postulates	.804	2.971	1.064
4. Discussion of emotions caused by experiencing and/or evoking a personal teaching experience	.792	2.981	1.112
5. Discussion of modifying planned activities with regard to the lesson plan on the basis of unexpected reactions from students	.791	2.849	1.076
6. Explaining personal difficulties encountered in teaching	.790	2.358	1.097
7. Explaining applied knowledge from pedagogy, psychology, didactics and methodology in the course of teaching experience	.789	2.603	1.247
8. Analysis of personal actions, convictions, values and motives in teaching	.768	2.896	1.077
9. Explaining the didactic theories used in the teaching process	.764	2.622	1.182
10. Discussion of fears, doubts and difficulties related to teaching	.760	3.009	1.091
11. Parallel analysis of the defined and achieved goals and tasks after class delivery	.756	3.122	1.110
12. Discussion about experiences from professional education and training (on internet forums, among school staff)	.754	3.141	1.116
13. Analysis of class delivery by other teachers (visits to other schools)	.716	2.745	1.317
14. Analysis of school documentation (Education Act, Ethical Code, Ordinance on Student Assessment etc.)	.634	3.452	.996
Factor 1.: Reflection on teaching practice in the light of psychological, pedagogical and didactic insights			

\* In order to facilitate interpretation, we have listed factorial saturations whose absolute value exceeds 0.3.

The range of standard dispersion of results (from SD= .99 to SD= 1.31) indicates rather non-homogeneous assessments attributed to the items of this scale.

On the basis of analysis of results obtained by means of factor analysis and descriptive analysis, it can be concluded that the *reflection* activities are poorly represented in various types of professional education and training of teachers, even though a new concept of professional development of teachers has been gradually introduced, in which the teacher is an active and reflective practitioner and a researcher of his/her teaching practice.

Numerous research studies have shown that reflection and discussion with other teachers about their experiences regarding the pursuits of a modern school foster professional development better than reading books or attending lectures (Bognar, B., 2011, Bilač, Miljković, 2017).

The results clearly show that traditional forms of professional education and training, whose purpose is to disseminate instruction on how to organize teaching by following someone else's guidelines and examples without actively reflecting on these, have still not been abandoned. One of the possible reasons for this certainly lies in the large number of participants in professional education and training of teachers on both the county and the national levels, which makes their active participation in pedagogical workshops and other forms of communication difficult. The factor analysis shows that *abstract conceptualisation* in the context of professional education and training of teachers is a one-dimensional construct. We singled out one factor whose characteristic root is greater than 1 (characteristic root for the factor: 6.737), which explains a total of 67.370% of the scale outcome variance. This factor was called Critical Analysis of the Connection between Theoretical Knowledge in Education and Teaching Practice (items 1 to 10). On the basis of this factor analysis, an eponymous scale was constructed.

The analysis of results (Table 5) of the Critical Analysis of the Connection between Theoretical Knowledge in Education and Teaching Practice scale shows that the highest average median value ( $M=3.15$ ) was attributed to the item Proposing New Approaches to Methodological Issues, while the lowest median value ( $M=2.49$ ) was attributed to the item Outlining Personal Insights from the Area of Didactics and Methodology in Papers Written for Professional/Scientific Conferences or Pedagogical Journals. The highest standard dispersion of results ( $SD=1.29$ ) was observed for the item Devising and Proposing Changes for the School of the Future, while the lowest standard dispersion ( $SD=1.01$ ) was observed for the item Linking the Acquired Knowledge about Teaching Issues to Learning and Teaching Theories.

Table 5: Factorial matrix of the *abstract conceptualisation* scale in the context of professional education and training of teachers and descriptive statistics of the items on the scale.

Abstract conceptualisation in the context of professional education and training of teachers	Factor* 1	M	SD
1. Linking the acquired knowledge about teaching issues to learning and teaching theories	.881	2.858	1.008
2. Outlining learning theories on which one teaching activity from your own personal experience was based	.878	2.943	1.102
3. Linking experiential insights to theoretical knowledge about methodology of specific subjects	.875	3.037	1.154
4. Creating proposals for new approaches to methodological issues (e. g. use of experiential learning in teaching)	.839	3.150	1.049
5. Linking concrete didactic issues to didactic theories and models	.829	2.839	1.122
6. Discussion about general values, principles and assumptions on which education system is based	.823	3.141	1.072
7. Suggesting solutions for current pedagogical and didactic issues (e. g. barriers to communication in the classroom, education crisis etc.)	.818	2.924	1.075
8. Finding connections between certain factors in the teaching process	.813	3.103	1.013
9. Outlining personal insights from the area of didactics and methodology in papers written for professional/scientific conferences or pedagogical journals	.718	2.490	1.205
10. Devising and proposing changes for the school of the future	.713	2.783	1.294
Factor 1: Critical analysis of the connection between theoretical knowledge in education and teaching practice			

\* In order to facilitate interpretation, we have listed factorial saturations whose absolute value exceeds 0.3.

The data obtained by means of factor and descriptive analysis of this scale show that the *abstract conceptualisation* activity, i.e. linking theoretical knowledge to teaching practice, is moderately or poorly represented in various types of professional education and training. Furthermore, useful practical experiences are insufficiently represented at conferences, professional presentations and in national or foreign journals. A possible reason for this is the insufficient material, emotional and professional support teachers receive in their school environment, preventing them from sharing their education solutions with others. For this reason, valuable practitioner experiences often remain unknown to the broader pedagogical public.

A good preparation for stimulating implementation of widely accepted scientific theories and practices adapted to the education context and a search for new paths in education, as well as critical examination and generalization of experiences, can be seen as activities supporting the creation of learning communities (Wenger, McDermott, Snyder, 2002, according to Bognar, 2009).

The factor analysis shows that *Active experimentation* in the context of professional education and training of teachers is a multi-dimensional construct. Two factors were singled out, whose characteristic root is greater than 1 (characteristic root for the two selected factors: 9.747, 1.228), which explains a total of 64.557% of the scale outcome variance.

With regard to the size of coefficients in the pattern matrix shown in Table 6, the first factor was called Research Activities in Teaching Practice (items 1 to 9), while the second factor was called Use of New Knowledge and Insights in Teaching Activities (items 10 to 17). On the basis of the factor analysis, two eponymous sub-scales were created.

On the Research Activities in Teaching Practice sub-scale (Table 6), respondents attributed the highest average value ( $M=2.93$ ) to the item called Developing an Additional Instrument for Monitoring Student Progress, while the lowest value ( $M=2.12$ ) was attributed to the item called Microteaching. The lowest dispersion of results ( $SD=1.02$ ) with a rather low median value ( $M=2.40$ ) was observed for the item called Carrying Out Smaller Research Assignments. The lowest dispersion of results ( $SD=1.12$ ), with a relatively low median value ( $M=2.62$ ), was observed for the item called Designing Activities for the Cognitive and Socio-Emotional Development of Gifted Students, while the highest dispersion ( $SD=1.30$ ) was observed for the item called Re-delivery of the Same Teaching Unit.

Furthermore, analysis of results (Table 6) for all the items of the Use of New Knowledge and Insights in Teaching Activities sub-scale shows that the highest average median value ( $M=3.46$ ) was attributed to the item Creating Didactic Games, while the lowest average median value ( $M=2.79$ ) was attributed to the item Developing a Plan for Establishing Partnership with Parents.

Table 6: Factorial matrix of the *active experimentation* scale in the context of professional education and training of teachers and descriptive statistics for items on the scale.

Active experimentation in the context of professional education and training of teachers	Factor*		M	SD
	1	2		
1. Microteaching – a short simulation of teaching situations recorded by means of a video-camera and later analysed	.985		2.122	1.285
2. Introducing innovations in school practice, based on action research and reflective practice	.913		2.603	1.126
3. Conducting action research on concrete teaching issues	.853		2.386	1.126
4. Re-delivery of the same teaching unit and introducing new elements	.814		2.330	1.307
5. Designing activities for the cognitive and socio-emotional development of gifted students	.723		2.622	1.125
6. Planning a stimulating environment for excellence for gifted students	.722		2.603	1.135
7. Developing an additional instrument for monitoring student progress (e.g. in the cognitive area, in oral expression etc.)	.656		2.934	1.181
8. Identifying gifted and talented children/students by using multi-dimensional models (e.g. Gardner questionnaire)	.651		2.547	1.196
9. Introducing new educational activities during winter holidays, in outdoor education programmes, during school trips	.526		2.915	1.130
10. Developing one's own multimedia content		.890	3.198	1.260
11. Using techniques that foster divergent and creative thinking		.860	3.028	1.073
12. Evaluation and assessment of student essays in accordance with the agreed descriptors		.813	3.169	1.182
13. Developing an Ethical Code as an integral part of the subject curriculum		.651	2.886	1.149
14. Assessment of one's own actions during the assessment process on the basis of the defined theoretical guidelines		.646	3.075	1.030
15. Development of a plan for achieving partnership with parents		.568	2.792	1.255
16. Creating didactic games (for practising logical thinking, improving memory, microspatial orientation etc.)		.489	3.462	1.114
17. Defining precise criteria for assessing student knowledge at different levels in accordance with the chosen taxonomy		.482	3.056	1.067

Factor 1: Research activities in teaching practice

Factor 2: Use of new knowledge and insights in teaching activities

\* In order to facilitate interpretation, we have listed factorial saturations whose absolute values exceed 0.3.

The highest dispersion of results (SD=1.26) was observed for the item Developing One's Own Multimedia Content, while the lowest dispersion of results (SD=1.03) was observed for the item Assessment of One's Own Actions.

The results obtained by means of factor analysis and descriptive analysis of both sub-scales (Table 6) show that *active experimentation* in the context of professional education and training of teachers is poorly or moderately present. We are aware of the fact that active experimentation was not feasible in the traditional model of professional education and training because a large number of teachers attended professional conferences and plenary lectures, without having to actively participate. However, in modern forms of professional education and training, there is no room for outdated methods. Instead, more emphasis should be placed on active involvement of teacher-practitioners, simulation of education situations and other forms of experimentation, thus developing competences for active participation among all participants.

Table 7: Descriptive statistics, symmetry, kurtosis and reliability of scales and sub-scales (Professional education and training of teachers).

Titles of scales and sub-scales		N	M	SD	S	K	Cronbach alpha
Acquiring knowledge	1.a Familiarity with developmental characteristics of students and classroom management	106	3.012	.864	.207	-.764	.937
	1.b Familiarity with didactic/methodological aspect of teaching	106	3.518	.722	-.218	-.487	.920
Concrete experien	2. Experience in using didactic/methodological knowledge and insights in teaching	103	3.101	.874	-.279	-.380	.955
Reflect observ	3. Reflection on teaching practice in the light of psychological, pedagogical and didactic insights	106	2.838	.980	-.093	-.420	.947
Abstr. concep	4. Critical analysis of connection between theoretical knowledge in education and teaching practice	106	2.927	.906	-.049	-.710	.944
Active experim	5.a Research activities in teaching practice	106	2.562	.980	.255	-.729	.943
	5.b Use of new knowledge and insights in teaching activities	106	3.083	.865	.035	-.557	.893

Since the questionnaire was created for the purpose of this study, the reliability of each scale and sub-scale was tested. It was established that all of them have satisfactory reliability coefficients demonstrating internal consistency, with Cronbach alpha coefficients ranging between .89 ( $\alpha = .893$ ) and .95 ( $\alpha = .955$ ).

To get a clearer image of average results obtained for each scale and sub-scale, we conducted a factor reduction and calculated the descriptive statistics, symmetry and kurtosis (Table 7). The highest average and relatively homogeneous result ( $M=3.51$ ;  $SD=.72$ ) with a negative kurtosis ( $K=-.764$ ) was obtained for the Familiarity with Didactic/Methodological Aspect of Teaching sub-scale. The lowest average value ( $M=2.56$ ) and negative kurtosis ( $K=-.729$ ) can be observed on the Research Activities in Teaching Practice sub-scale. The highest dispersion of results ( $SD=.98$ ) was achieved in Reflection on Teaching Practice and Research Activities in Teaching Practice sub-scales.

According to this data, it can be concluded that reflective and research activities are poorly or moderately present in the professional education and training of teachers. Therefore, these results based on respondents' answers are an indicator of teachers' dissatisfaction with this type of professional education and training, which does not contribute to their professional development in a satisfactory manner. The three types of knowledge necessary for competent work of teachers are theoretical knowledge (academic, higher education knowledge and research results whose function is to improve teaching practice); professional knowledge (knowledge acquired through teaching); and practical knowledge (knowledge based on the reflection on one's own experience) (Meyer, 2002: 186). In respondents' professional education and training, the least emphasis is placed on the development of teachers' research and reflective abilities.

Correlations between all scales and sub-scales (Table 8) are positive and statistically significant, whereby the highest degree of positive correlation ( $r=.866$ ;  $p<0.01$ ) was observed between the scales Experience in Using Didactic/Methodological Knowledge and Insights in Teaching and Reflection on Teaching Practice; followed by the correlation between the scale Reflection on Teaching Practice ( $r=.857$ ;  $p<0.01$ ) and the sub-scale Research Activities in Teaching Practice, as well as between the scale Reflection on Teaching Practice ( $r=.833$ ;  $p<0.01$ ) and the sub-scale Use of New Knowledge and Insights in Teaching Activities.

Table 8: Correlations between scales and sub-scales of the Professional education and training of teachers questionnaire.

Titles of scales and sub-scales	Correlations between scales and sub-scales						
	1.a	1.b	2.	3.	4.	5.a	5.b
1.a Familiarity with developmental characteristics of students and classroom management	1						
1.b Familiarity with didactic/methodological aspect of teaching	.745**	1					
2. Experience in using didactic/methodological knowledge and insights in teaching	.801**	.820**	1				
3. Reflection on teaching practice in the light of psychological, pedagogical and didactic knowledge and insights	.725**	.712**	.866**	1			
4. Critical analysis of the connection between theoretical knowledge in education and teaching practice	.714**	.601**	.801**	.796**	1		
5.a Research activities in teaching practice	.715**	.535**	.793**	.857**	.774**	1	
5.b Use of new knowledge and insights in teaching activities	.731**	.694**	.777**	.833**	.751**	.789**	1

\*\*  $p < 0.01$

The degree of correlation indicates that respondents do not distinguish between these constructs and that these should be revised and more clearly differentiated. The difficulty in developing those constructs stems from the choice of topics and manner of delivering professional education and training, which are limited by the number of participants and the time available for the delivery of planned activities.

## Conclusions

On the basis of the study conducted among teachers in Istria County, we have obtained concrete indicators about the presence and integration of theoretical and practical components in structured types of professional education and training. On the basis of the statistical results, it can be concluded that theoretical components are the most frequently encountered in professional education and training, i.e. memorizing and explaining factual and conceptual knowledge.

Moderate and low median values indicate that there is a relatively low presence of concrete experience, poor linking of theory to practice and insufficient practical application of the new knowledge and insights acquired.

Teachers' answers indicate dissatisfaction with the number of activities focused on their reflection on teaching and learning in the light of theoretical knowledge and insights, linking theory to practice, stimulating research activity in teaching practice, and using new knowledge and insights in teaching. The results show that a teacher's expertise is still not sufficiently valorised to be used for stimulating action research and active participation at professional and scientific conferences. It can also be concluded that traditional types of professional education and training, whose purpose is to disseminate instructions on how to organize teaching by implementing guidelines provided by scientific experts, have still not been abandoned in favour of outlining examples of good practice and reflecting on them, or in favour of using new knowledge and insights in experimental-type workshops. We hope and believe that the situation is different in other counties in the Republic of Croatia, as this research included only teachers from Istria County.

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