



Towards a conceptualized model of supporting teachers' application process for acquiring professional qualifications

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ABSTRACT

Teacher professional evaluation and teacher self-evaluation have always been a challenge. Unfortunately, there are not enough opportunities to help teachers assess their professional development, developmental needs and levels of qualifications. The current study examines teachers' expectations for the technical application to support the assessment of their professional development and qualification application process. The theoretical framework of the study is based on the concept of professionalism, which includes the expected qualification of a teacher and their lifelong professional development. The data for this paper were collected through semi-structured focus group interviews and analysed using qualitative inductive content analysis. The results clearly reveal the teachers' vision of the specific expectations and the need to create the technical application that supports the teacher in both self-analysis and self-assessment, as well as in the professional qualification application process. The creation of the technical application helps teachers in valuing their work, and defining themselves as learning professionals, while supporting their professional self-development and self-esteem.

Introduction

Changes in society pose new challenges for schools. Teachers have a key role to play in the process of implementing change which requires them to be more professional (Hoyle, 2008) and ensure the quality of the education they provide (Kleinhenz & Ingvarson, 2007; Snoek, Swennen & Van der Klink, 2011). Teachers are expected to support the development of their students into future professionals who are able to adapt to the expectations and needs of future society (The Organization for Economic Cooperation and Development, 2019). Thus, the teachers' professionalism and professional development (PD) play an important role in the perspective of sustainable education (Hoyle, 2008).

One way to support teachers' PD is applying professional standards

(PS). PS is the national standardized norms for assessing the knowledge, skills and professionalism required of teachers (Toledo-Figueroa, Révai & Guerriero, 2017). It aims to ensure the quality of teaching and the quality of teachers, and can be described in general terms as a broad set of descriptions that teachers can strive for, but also specifically: as clearer descriptions, allowing evaluators to evaluate teachers' work based on evaluation criteria (Thrupp, 2006). The concept of the standards is to define the quality or the level of achievement, i.e. the measure of teachers' qualities against the requirements of the qualification framework (comparative assessment). PS is also seen as a tool for improving teachers' reputation i.e. the qualifications they achieve ensures quality and self-confidence (Sachs, 2003). It plays an important role in assessing teachers' PD, providing opportunities for certification

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³ My name is Irene-Angelica Chounta and currently, I am a Junior Professor in "Computational Methods in modeling and Analysis of Learning Processes" at the Department of Computer Science and Applied Cognitive Science at the University of Duisburg-Essen in Germany. My research focuses on computational learning analytics for technology-enhanced learning, Artificial Intelligence in Education (AIED) and educational technologies. My main research interest is to model learners' behavior in order to provide adaptive and personalized feedback, either in formal or informal contexts.

and recognition (Ingvarson, 2010). It is very important to notice the connection and intertwining between teacher self-analysis and PS.

De Vries, Jansen and van de Grift (2013) monitored teachers' PD based on Schön's theory (Schön, 1983). He saw self-analysis as a conscious observation of one's knowledge, beliefs, opportunities and actions, and as a subconscious process that teachers develop through learning from experience. Self-assessment of the achievement or non-achievement of goals affects teachers' self-efficacy and the decisions they have made. Self-assessment develops a sense of responsibility via teachers' reflection, self-management and independence (Sadler, 2005). Thus, self-analysis based on PS performance indicators helps teachers to recognize their professional strengths and weaknesses and also emphasizes self-developmental needs (Ingvarson, 2003).

The aim of the PS, used in Estonia, is to support teachers throughout their careers by emphasizing the role of teachers as reflective practitioners and lifelong learners (Pedaste, Leijen, Poom-Valickis & Eisenschmidt, 2019). The assessment of a teacher's professional competence is based on PS and feedback from the vocational assessment committee (Leibur, Saks & Chounta, 2020). The applicant's compliance with the requirements is assessed based on the relevant documents, self-analysis (e-portfolio), and the interview.

The previous study conducted by the authors (Leibur, Saks & Chounta, 2021) revealed shortcomings in the first stage of the application process and teachers' expectations for improvements. Different target groups (teachers and assessors) pointed out the problems as excessive time and workload which is needed for compiling the e-portfolio; the complexity of the self-assessment process; the lack of a common understanding of PS; the complexity of proving competencies, and insufficient feedback. It was found that teachers can assess themselves using PS, but they do not receive sufficient feedback on their development, developmental needs and the level of professional qualifications (PQ), and they do not have the opportunity to monitor their PD.

Although much research has been done on professionalism (e.g. Berliner, 2005; Freiman-Nemser, 2001; Fullan, 2005; Lieberman & Wilkins, 2006; Orit, 2016), little is known about teachers' expectations and needs for (technical) facilities that make the application and self-assessment process more efficient and support teachers' PDs.

Therefore, the aim of this research is developing and proposing a model for designing a technical application (TAPP) that meets the needs and expectations of the target groups in terms of their PD and applying for the qualification. The focus of the study is on the needs and expectations of the target groups in conducting self-analysis, self-assessment and compiling evidence-based documentation necessary in the process of the qualification application. Self-assessment is a time-consuming process that could be made simpler and more effective through a technical application. The competence-orientated TAPP is based on teachers' PS.⁴ In the long run, our goal is to develop this technical application to support the PD of teachers (through competence-based self-analysis based on PS), ensuring continuous feedback and support throughout the application process, thus supporting teachers' attitudes to lifelong professional learning.

Based on the aims of the study, the following research questions (RQ) were asked:

RQ1: What are the needs and expectations of different target groups for the TAPP supporting the PD of teachers and applying for the profession?

RQ2: Which should be the design and functionalities of the TAPP support the PD of the teacher and the application process?

⁴ 1) planning of learning and teaching activities, 2) design of learning environment, 3) support of learning and development, 4) reflection and professional self-development, 5) counselling and mentoring, 6) development, creation and research activities.

Theoretical framework

There is a wealth of sociological literature that includes definitions and taxonomies of teacher professionalism (e. g. Hargreaves, 2000; Snoek et al., 2011). However, there are inconsistencies in the definition of professionalism, resulting in different interpretations that can be both competing or even contradictory (Fraser, Kennedy, Reid & McKinney, 2007). On the one hand, a professional is considered to be someone who has the appropriate education, works in a profession, has a clear vision, knows and applies different methodologies (Simons & Ruijters, 2004). On the other hand, a more critical approach sees it as a state-imposed obligation that burdens the teacher (Santiago, Benavides, Danielson, Goe & Nusche, 2013). Thus, theories of professionalism have changed and general interest is directed towards professional learning (e.g. Stoll, Earl & Fink, 2003).

The present study relies on the concept of professionalism, which focuses on the expectations of today's competitive knowledge society where teachers are expected to continue their PD (Simons & Ruijters, 2014) throughout their career. When creating the learning professional model, Simons & Ruijters based their analysis on the concepts of professionalism and long-term research (2004). They developed their model by taking a deeper look into the learning methods and identity of the learning professional (2014). The theory has been used in various researches based on the concept of the learning professional: for example, the effect of the teacher's professional competence and reflection (Leijen, Pedaste & Lepp, 2020); PD in education (Børte, Nesje & Lillejord, 2020), and PD in higher education (Huisjes, Engbers & Meurs, 2020).

Simons & Ruijters theory has been further developed in the Concept of Networked Communities (Improvedo, 2021) and in Vocational Training (Nerland & Damsa, 2019). Rudkevych and his colleagues investigated the evolution of teachers' competence frameworks based on policy documents (Rudkevych et al., 2020). Also Love and Barrett (2019) made use of Simons & Ruijters theory focusing on the training of professional composers. All the above studies are built on Simons & Ruijters model of the learning professional.

Simons and Ruijters originally described professionals through 8 qualities: highlighting commitment, honesty, extensive knowledge, action theory, competencies, professional communities, autonomy and authority. Two of these qualities were classified under requirements (commitment and honesty) and two under benefits (autonomy and authority) (Pedaste et al., 2019). Thus, Simons and Ruijters characterize a professionalism through 4 characteristics (Fig. A1): learning professionals are interested in continuous self-improvement; they are ready to critically analyse their activities; acquire new knowledge of theories and research; they are reflective practitioners who belong to professional communities and are able to work in the community and across disciplines. To sum it up, being a professional is a free choice of a teacher (Simons & Ruijters, 2014), and maintaining this status requires constant improvement of the above-mentioned qualities.

Based on modern education policy, where the focus is on standardization, also in terms of teacher qualification requirements (Angulo, 2020), we added to the concept of a learning professional the feature mentioned by Snoek, i.e. compliance with professional standards. The characteristics of professionalism formulated by both Snoek et al. (2011) and Pedaste et al. (2019) largely coincide with the characteristics presented by Ruijters (2014). Ruijters and Pedaste (based on Ruijters, 2014) have also singled out the benefits of professionalism and the requirements for professionalism. In Snoek's theory, all criteria of professionalism are formulated as attributes, while Pedaste qualifications to the goals, which emphasizes the importance of self-definition and self-improvement of the learning professional.

While the model of concept combines four sub-constructs (qualities, aims, requirements and benefits), in the light of the current research, it is relevant to highlight the following three: **requirements, characteristics and objectives** (Fig. 1).

The core of the concept of a learning professional is the requirement of professionalism, i.e. responsibility for one's professional activity and quality. Achieving this is ensured by the teacher's commitment and desire to work in their profession. The above can also be called core professional values which include the following: positive relationships with other teachers and parents; creating equal opportunities, taking other people and their interests into account; involvement in ethical issues and resolving student value conflicts; commitment to PD and development of professional assessment; a sense of responsibility for personal and collective action and maintaining confidentiality (Arthur, Davison & Lewis, 2005).

The requirements are closely linked to professional **qualities**. The qualities draw attention to the teacher's qualifications and the use of PS to regulate the teacher's work. An output-based and results-orientated education system is also reflected in teacher qualification requirements, encompassing outcomes and competences, and referring to the importance of teachers' further PD (Snoek, Swennen & Van der Klink, 2009). A teacher monitors their PD and training needs to keep abreast of contemporary educational innovations and thereby continuously improve their knowledge to have an academic knowledge base (Guerriero, 2014) consisting of content knowledge, pedagogical knowledge and nowadays also technical knowledge (Doyle, Seery & Gumaelius, 2019). In addition, teachers are expected to be able to analyse and reflect their work in the light of their professional experience (Simons & Ruiters, 2014; Snoek et al., 2009). Cooperation with different target groups (colleagues, students, parents) and different communities is also important, supporting the application of new knowledge and skills. Thus cooperation (both professional and non-professional) as another element of qualities is based on society's expectations and focuses on new forms of relationships (Drossel, Eickelmann, Ophuysen & Bos, 2019; Hargreaves, 1996), i.e. cooperation with colleagues, students, parents (which can turn out to be the biggest challenge for teachers) and cooperation outside the profession (Whitty, 2008). Through professional learning communities, collaborative learning and sharing of experiences amongst teachers is possible (Bolam and McMahon, 2004).

The goal of professionalism is the willingness to participate in lifelong learning. This is the feature of professionalism, which concerns the PD of teachers throughout their careers (Hargreaves, 1996; Evans, 2008). It assures competitiveness in an ever-evolving knowledge society (requires continuous self-improvement from teachers). The importance and need for lifelong learning throughout PD are also emphasized by European Trade Union Committee for Education (2008) who considers continuous professional development being integrated systematically in the teaching profession and which should enable teachers to improve their qualifications. Realizing these goals keep teachers at work in their field which is also extremely important (Pedaste et al., 2019).

Following the above-mentioned goals, characteristics and requirements, should results in an increase in the independence and authority of teachers as learning professionals and an opportunity to improve their qualifications. It is important to see a close connection and interaction in terms of requirements, characteristics, goals and benefits, which together form a complete picture of the professional. Thus, the

concept of professionalism forms a comprehensive approach to professionalism, which is based on lifelong professional learning and recognizes the development of an autonomous professional.

This research also draws on the teacher Qualifications Framework (Estonian Qualifications Framework, 2021) which is viewed together with teachers' PS and the continuation of their career. It sees the professional qualifications framework (PQF) as a tool based on specific quality requirements (i.e. PS) helping to determine a teacher's qualification level.⁵ Thus, the PQF (by PS) is considered a tool for quality assurance (Kleinhenz & Ingvarson, 2007).

Teachers' professional development

Teachers' PD takes place through the daily work of the teacher, and it depends on both the teachers and the education system (Feiman-Nemser, 2001). The focus on inclusive education and competency-based curricula leads to the need for personalized teaching and learning i.e. self-improvement (OECD, 2018). This has a significant impact on the role of the teacher as they have to master different methodologies, teach students with SEN, constantly update educational innovations etc. Teachers have to collaborate with different target groups and professional communities. Therefore, in the PD of a teacher, personal interest and national interest should overlap and find common ground in terms of development needs, based on PS of a teacher, the output of which is PS as a definition of continuous professional development (CPD), self-assessment and professional qualification (PQ) level. PS works as a measurement tool in defining a teacher's PD and in self-analysis (Ingvarson, 2010).

The teacher's task is to keep abreast of and follow curriculum developments and the changing work environment, as well as the renewed methodology (Darling-Hammond, 2005). Thus, teachers' PD consists of a combination of their teaching and learning experiences, during which, on the one hand, the teachers develop their critical thinking, problem-solving skills, expand their pedagogical knowledge and improve their skills. On the other hand, they pass on what they have learned to their students with the aim of teaching, developing and nurturing a fully-fledged person. Although the concept of teacher PD is defined differently, it is roughly seen as a process of teacher self-development (Feiman-Nemser, 2001) as well as a process of improving teacher performance (Gall et al., 1985) and as a means of improving students' academic achievement (McLaughlin & Zarrow, 2001). All the definitions listed above are united by the idea that the PD of a teacher is a continuous dynamic and lifelong learning process (Collinson et al., 2009), which is very important both for improving their academic performance and work efficiency, as well as for increasing teachers' commitment, identity and professional satisfaction (European Commission, 2013). Due to the constantly changing context of professionalism, the role of teacher, mentor and supervisor is expanding (Sim et al., 2012) and therefore it is very important to develop cooperation and partnership between schools and universities (Martin, Snow & Torrez, 2011). It is clear that PD is based on the commitment of teachers, the collaboration of teacher practitioners and researchers, and the integration of theory and practice (McMahon, Forde

⁵ The following competencies of the teacher PS are in use in Estonia: learner support; planning of learning and teaching activities; teaching; reflection and professional self-development; cooperation and mentoring; development, creation and research (the master teacher also has leadership). Optional competencies: at teacher – level 7: support for learners with special educational needs, implementation of digital pedagogy; at senior teacher – level 7: management, teacher guidance and training, development of methodologies and study materials, supporting learners with special educational needs, implementation of digital pedagogy; at master teacher – level 8: instruction and training of teachers, development of methodologies and study materials, supporting learners with special educational needs, implementation of digital pedagogy.

& Dickson, 2015). Based on the above, it is clear that academic knowledge enables them to understand educational theories and to be aware of the experiences and conclusions of specialists from all over the world (Hargreaves, 2000).

The teacher's maintaining their professionalism is their own responsibility and choice (Simons & Ruijters, 2014), teachers need to find time and energy to contribute to their CPD, but the support of the education system and the employer is important to maintain a strong and competent teaching profession (Sachs, 2005).

Based on the previous, the proposed TAPP aims to enable teachers to continuously monitor and analyse both their teaching practices and their PD, to identify their development needs, and to support self-development in order to raise the PQ. Grounded on the findings of the empirical research with the target groups, a theoretical model of a TAPP is proposed.

Methodology

We conducted a qualitative study to examine the expectations of those involved in the process: teachers currently applying for the occupational qualification, teachers who had been awarded the occupational qualification, professional assessors, and teachers who are involved in developing PS. We used semi-structured focus groups to obtain detailed and in-depth insights, and encourage interaction between teachers to identify and express their expectations concerning the application process (Patton, 2002). Through the focus groups' joint discussions, teachers' opinions and attitudes were gathered in order to formulate common expectations about the technical application and anticipated benefits to supporting the teachers' PD and the application process.

Participants

The study used a targeted strategic sample (Trost, 1986), that consisted of people from all target groups complying with the aim of the research (Table A1): 12 participants split it 4 focus groups randomly - 4 teachers (level 7), 1 senior teacher (level 7*) and 7 master teachers (level 8). Teachers were contacted through the Teachers' Union, as the criterion for participating in the study was their involvement in the application process.

According to the Estonian Qualifications Framework (EstQR), professional qualification levels range from 1 to 8, teachers' qualification levels range from 7 to 8. The level is related to education, so only a teacher who has at least master's degree can apply for a teaching profession. By qualification teachers are divided into 3 levels: teacher - level 7; senior teacher - level 7* and master teacher - level 8. Teacher - level 7 lasts throughout one's career, the higher levels need to be renewed every 5 years.

Data collection

For collecting data, the semi-structured interviews were used to extract information from the focus groups. Focus group interviews were conducted in the Zoom environment regarding the limitations of Covid-19. The interview protocol was designed and the questions were formulated based on the research questions. The interview questions were tailored for different target groups according to their role in the qualification application process (Appendix A): 12 questions for applicants, 12 for teachers with qualification, 13 for assessors and 13 for PS developers. The purpose of the questions was to explore the teachers' expectations on the functionality of the TAPP to support the teacher's PD and the application procedure, that is RQ 1 (interview questions 1–10). The second half of the questions, that is RQ 2 (interview questions 11–13), aimed to find out how the created TAPP would support the teacher's PD and the application procedure. At the beginning of the interview, the interviewer introduced herself and the purpose of the

study. The interviewees were informed of the confidentiality of the process and asked for permission to be recorded. Prior to the interview, the interviewees filled in the participant's informed consent form. The shortest interview lasted for 1 hour and 45 min, the longest for 2 h and 15 min.

Data analysis

The focus group interviews were analysed following the inductive thematic analysis procedure (Braun & Clarke, 2006). It means the data were analysed without any predetermined framework and themes were inductively drawn from the data. The interviews were transcribed on a total of 20 pages. In the transcripts, pseudonyms were used. Fragments of recordings that might reveal the interviewees' identity were not transcribed. To analyse the data, NVivo⁶ qualitative data analysis software was used.

The first author read the transcripts several times to acquaint herself with the data. Next, initial codes were generated and grouped into categories. To increase the reliability of the study, the data were coded twice and then coordinated with the co-authors.

For RQ1, the coding process provided 9 codes, which were divided into 2 main categories; for RQ2, the 9 codes also resulted in the same kind of division. As the final step, a detailed description of the results was written and illustrated with quotations. For both research questions similar categories emerged (Fig. A2). and Ruijters formulated qualities, requirements, and benefits that are closely related and affect each other. That is the difference between the three concepts. Pedaste and his colleagues have pointed out the close connection between the professional standards of proficient students and the goals of the characteristics, on the basis of which the authors added their formulated goals to the following model of professionalism (Fig. A1). The authors added the improvement of professional

Results

The results of the data analysis will be presented according to the research questions and described by main and subcategories (Fig. A2). The results of the study are illustrated with excerpts from focus group interviews with the interviewees' names replaced by pseudonym.

RQ1: What are the expectations of different target groups for the TAPP supporting the PD of teachers and applying for the profession?

Core functions

Security and access

Before conducting the self-analysis, teachers must select a web-based environment for creating the e-portfolio as well as storing and organising all their documentation. However, as free web environments are generally public, all target groups see the need for a protected personal environment for storing teacher documentation and self-analysis.

That's the key word - a personal environment! My biggest problem was the choice of environment. (A1)

All target groups pointed out the need to use a secure web environment.

My documentation should be collected in my own personal system, on the basis of which I can make my self-analysis. (D1)

It was found that a teacher's job analysis does not have to be publicly available on the web. The teachers should be free to choose with whom and how much they share their PD journey.

It should definitely be a protected environment - because there is my

⁶ <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>.

specific data, it is my self-analysis. What you want to exhibit, your materials or ... that would be the web version. But specific information about the teacher, it should be personal, accessible with personal identification code only. (TA3)

All target groups see the need for a protected environment that guarantees the privacy of their data and professional information.

Self-analysis

Self-analysis is an important reflection of PD, the teachers analyse their work as outsiders. This is a special skill and one of the indicators of PD, i.e. the opportunity to delve into one's professional activities, analyse them and find one's strengths and weaknesses. Self-analysis is a complex, time-consuming and at the same time very important part of interpreting and becoming aware of one's PD.

You have to have a closer look at yourself, in fact I do all that, but I am not aware of doing this. (T1)

Both the applicants and professional teachers considered it important to point out that self-analysis initially creates confusion, i.e. what exactly, how much and where to write.

... first of all, to understand at all - what form this self-analysis should be in and how to write it, I searched the internet a lot to find some specific examples and models. But there weren't many of them there. (TA3)

Thus, the TAPP is expected to have a clear questionnaire format that can be completed by everybody and that would support the process of self-analysis with its clarity and comprehensibility.

For some people, it's probably easy, they just write - it depends. I had to think a lot about what I would write there. (T2)

What matters to me is the reason why I do this and after I have done it I need to understand what I've done specifically. (TA1)

All target groups found that teachers' self-expression and literary skills are different, so the application is expected to ensure concreteness in writing.

Compliance with PS performance indicators

Self-analysis is based on PS, which in turn are written down as performance indicators. Teachers are expected to analyse or describe their activities based on a specific PS performance indicator.

The competencies have been explained, but what should I write about my experience under each point? If I had just reflected the given sentence, it would have been too little. (T3)

In the same login environment where teachers can decide if they have any of the competences - they write in a few sentences what they do within that competence. Then there would be no need for the large e-portfolio (like a literary novel). (D1)

To improve the situation, the TAPP is expected to provide a common format to follow (as a questionnaire).

Structure

All target groups considered it necessary that the self-analysis performed in the TAPP maintains the structure of the performance indicators of the PS.

... this would make it easier to write and easier to read. If the performance indicator says - describe or give an example, the applicants can add their descriptions into the self-assessment box. (A2)

It should remain in a fixed structure, in the form of a table - so this can be submitted to a Professional Evaluation Committee. (T3)

Such a breakdown would facilitate performance-based self-assessment, supported by evidence-based material provided by the teacher.

Length

The volume of self-analysis can be determined by the teachers themselves, which has led to both novel-like and also very concise writings. Expectations for determining the scope of self-analysis (for example, number of words, uniform size of writing area, etc.) were also pointed out by all target groups. There is currently no precise

information on the length to which the self-assessment must be performed.

... the maximum volume of self-analysis, how many words I will write on this topic. And some of these questions could be preferably multiple choice (yes / no), or will it remain a system of cells where I can enter my analysis? (T2)

Applicants suggested that the self-analysis form could be used as a practice questionnaire to continuously assess oneself and identify one's developmental needs.

This could be a practice questionnaire. I can practice and see what the outcome in percentages would be - then I can improve my skills and do it again. It would give opportunity to change and develop! (T1)

Data collection

The target groups considered the data collection important. The data collection was seen as an opportunity to collect all personal data from both protected environments (national professional web environments/data bases) and the open web.

If the TAPP collected data and added a self-analysis (based on performance indicators) - it could be called a supported analysis. (D2)

If the different links that are collected were working properly (opening), then it would be ideal. (A2)

They also expressed the view that teachers should be free to choose which data they use and which they do not.

The degree of evidence

When applying for the profession, it is necessary to add evidence-based material (documents, links, photos, etc.) to the self-assessment, which proves the performance of the teacher's activities and through which the teacher's competencies are revealed.

The volume of evidence-based material is undefined, which confuses teachers.

There could be some sort of minimum and maximum, so a smart limit should be set. (A3)

All target groups suggested that the TAPP could alleviate the evidence-based problem with recommendations based on PS performance indicators and data collection.

All target groups found that in-app evidence-based self-analysis is an important confirmation of a teacher's PD:

It would be good for teachers if TAPP provided to the function for storing their evidence - so, if they have a developmental interview at school, they can make an excerpt to help them. Or when they go to a job interview - they can make an excerpt or share their evidence. (D1)

It would also be possible to use self-analysis with evidence-based materials according to the teacher's needs, whether in a development interview, professional candidacy, etc.

If this is done in this way, then maybe it can also be used for its intended purpose: for example, in a school developmental interview. (T2)

Uploading files

It was found that as an additional function, the TAPP could allow uploading files, recommendations and support letters.

You can upload grant letters if you have done something at your school, county, or state level. You can also add a CV! (D3)

This function would allow teachers to give school management an overview of their professional development and the management could use it to communicate their evaluation to the teacher.

Feedback

The need for feedback was pointed out by all 4 target groups. Ongoing feedback is expected throughout the self-assessment and application process: feedback on self-assessment, feedback from school management, feedback on the submission of documents, and feedback from the Evaluation Committee.

In fact, the applicants should be given guiding and encouraging

feedback (A2) so that they would feel supported throughout the process. They are nervous anyway, and that PS are confusing enough, causing insecurity. (T3)

Feedback is expected at all stages of the application process:

... the first-time applicant should receive specific feedback and additional questions immediately. (D, A)

After conducting the self-assessment and adding evidence-based materials, all target groups expect feedback, which is first provided by the system in percentages (according to compliance with the performance criteria of the PS) and after some improvement as verbal feedback.

...one would be able to keep track of what they are good at all the time! (D2)

If the applicants then submit their dossier to the Evaluation Committee, they will receive verbal feedback and recommendations for further development.

Feedback should be received after each PS professional standard stage. Once the self-assessment has been carried out, there should be feedback from the system, accompanied by recommendations from the Commission for improvements. If the analysis has been sufficient, it is accepted. (TA3)

The target groups considered it necessary to share additional questions (in case there is a need to specify competencies or competencies do not appear) to the applicant through the TAPP.

... sending additional questions to the applicant. Then it could go through the TAPP (in the same environment). Evaluators draft additional questions and add them into the TAPP. (A2)

It is also expected to be able to share your documentation through the TAPP, which would save time and reduce paper or file production.

If the applicants share their self-assessment with the Vocational Evaluation Committee, the VAC could write down their feedback or questions immediately.

In this case, the number of evaluation sheets of the VAC could also be adjusted by reducing the production of Commission documents. (A1)

It was also considered necessary that a space be left in the self-analysis form of the TAPP, where the school management as well as the VAC could provide feedback.

Supportive functions

In addition to the above, other functions are expected from the application, which would significantly save teachers' time and enable the TAPP both to support PD and to increase the efficiency of the application process. The expected features are: dashboard and a progress bar.

Dashboard

All target groups expect the TAPP to provide teachers with the visual dashboard, which is considered necessary to get a visual overview of the teacher's PD. This would be a visual representation of the outcome of the teachers' self-assessment process - an overview of their competencies.

Applicants could receive visual diagrams of their competencies, thus forming a personalized set. (D1)

By using the teachers' visual dashboard, it is hoped to get a better overview of their level of PD.

Progress bar

It was considered very important for all target groups to have a progress bar that would help teachers to better orientate themselves in the different parts of the application process.

And then it would give an overview, for example, a coloured bar could run next to it - to show how much has not been yet done. The green end of the bar would show how much has been done. (TA2)

Through this function, first-time applicants expect to receive confirmation of the correctness of their activities and to receive a quick overview of the process.

RQ2: Which should be the design and functionalities of the TAPP support the PD of the teacher and the application process?

The analysis of the data for the second RQ had the same subdivision (Fig. A1).

Core functions

Security and access

A protected web-environment would give teachers a sense of security that their self-analysis is protected and cannot be found by search engines, thus would exclude the possibility of plagiarism. A unified documentation repository function was also considered important, which would allow teachers to quickly find their own self-analysis or other necessary professional documentation.

It would be very good, in this case all things in one place (A2) private environment (TA2). No need to surf in different environments. Also, the explicitness and clarity. (TA1)

The web-environment provided by the TAPP would allow teachers to store their years of PD self-analysis and feedbacks, which would greatly facilitate the management of materials and, if necessary, their sharing.

If I am a re-applicant. Then I have the application documentation / self-analysis of the previous procedure and the questions and feedback of the VAC in that environment. It would give teachers an overview of their PD and their career history (A1)

A previous study by all target groups pointed out that creating an e-portfolio is a long, time-consuming and complex process that requires teachers to work hard (Leibur et al., 2021). All target groups found that this problem would be solved by the password-protected (logged in) web environment provided by the TAPP, which would ensure the teachers' sense of security and protection of their materials.

Self-analysis

The TAPP's support for the PD of teachers is seen most in self-analysis. Self-analysis was understood by the target groups as an impartial sideline of oneself: describing and evaluating one's activities, as well as analysing oneself, which would all support the awareness and help of one's strengths and weaknesses.

The target groups found that the in-app form of self-analysis would fully support the teacher's self-reflection:

.. if there is such a helpful form - a blank page or file scares people the most. (A)

Teachers with qualification valued self-analysis as an opportunity to gain an overview of their PD.

Self-analysis with the help of the TAPP - is a supporter of the teacher's professionalism. It would not let a person conform in any activity criteria, you're forced to write a self-assessment as part of the app's self-assessment questionnaire. People get tired, but this app won't let them get tired (T2)

Compliance with PS performance indicators

All interviewees pointed out that with the help of the TAPP it is also possible to prevent the reflection of PS performance indicators, as teachers need to write a corresponding self-analysis or a description of the performed activities for each performance indicator. It was considered important to have the options of adding to the self-analysis either a description or analysis of one's verifiable activities.

...the self-assessment based on performance indicators would be the supported analysis. (D2)

It was found that the instructions attached to the self-assessment (either for describing, analysing compliance with the performance indicator, etc.) would fully support the self-assessment process. The TAPP's self-analysis questionnaire would also help to move according to

Table A1
Background information of the participants.

Focus group	Role in the Professional application process	Participant	Professional Qualification level
Focus group No1	teachers currently applying for the occupational qualification	TA1	Applying for level 8
		TA2	Applying for level 7
		TA3	Applying for level 7*
Focus group No 2	are awarded with occupational qualification	T1	Qualified for level 7
		T2	Qualified for level 7
		T3	Qualified for level 7
Focus group No 3	professional assessors	A1	Qualified for level 8
		A2	Qualified for level 8
		A3	Qualified for level 8
Focus group No 4	teachers who are involved in developing PS	D1	Qualified for level 8
		D2	Qualified for level 8
		D3	Qualified for level 8

Notes: TA–teacher applicant; T–teacher with qualification; A–assessor; D–developer of PS.

the PS thematic blocks and would exclude the possibility to skip the PS performance indicators.

The self-assessment form in use and the analysis based on it help to maintain the structure of performance indicators for professional standards (A2)

Thus, performance indicators of the professional standards provided by the TAPP as a questionnaire help teachers to systematically analyse themselves and support the continuity of the process.

Structure

The target groups pointed out the importance of a unified structure of self-analysis that the TAPP should maintain, based on PS. On the one hand, the structure makes it easier for teachers to understand the process of self-analysis and the description of their activities, on the other hand, structured self-analysis facilitates the analysis and assessment of competencies.

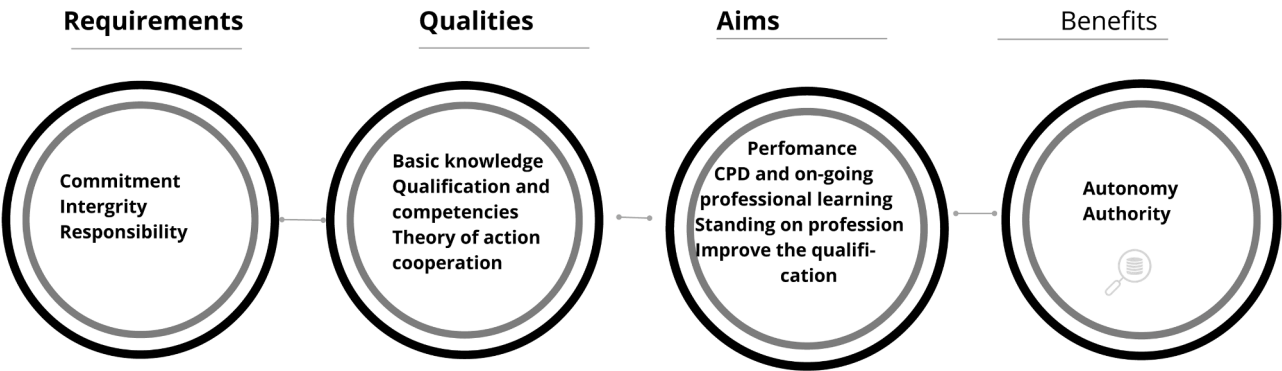


Fig. A1. Concept of professionalism designed by the authors based on Pedaste et al. (2019) and Snoek et al. (2011), Simons and Ruijters (2014).

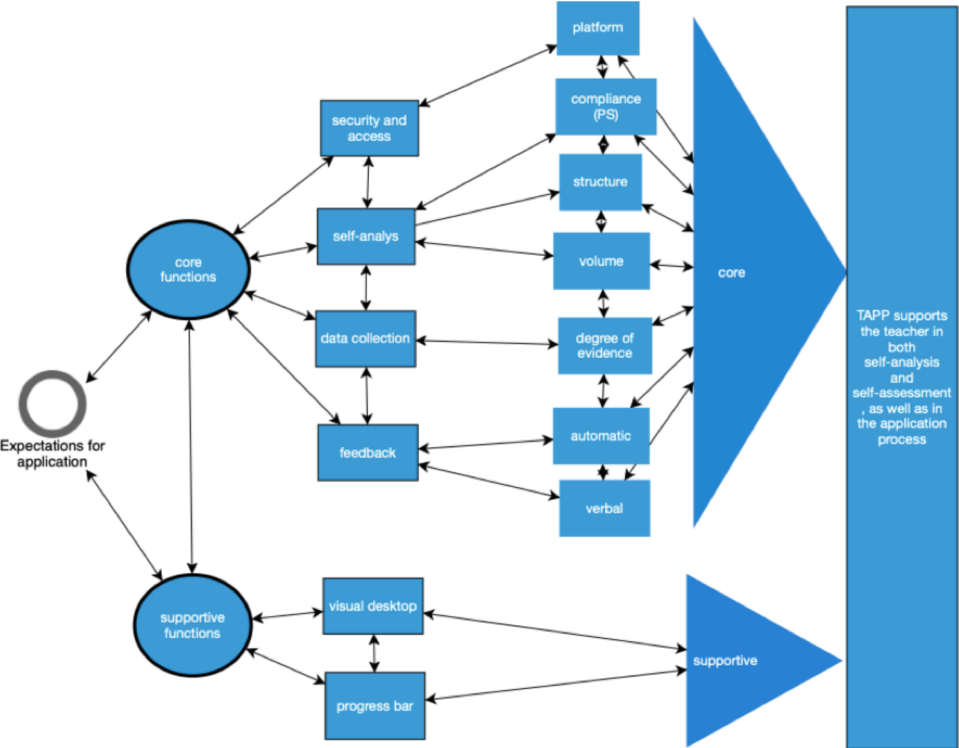


Fig. A2. Categories, subcategories and their integration.

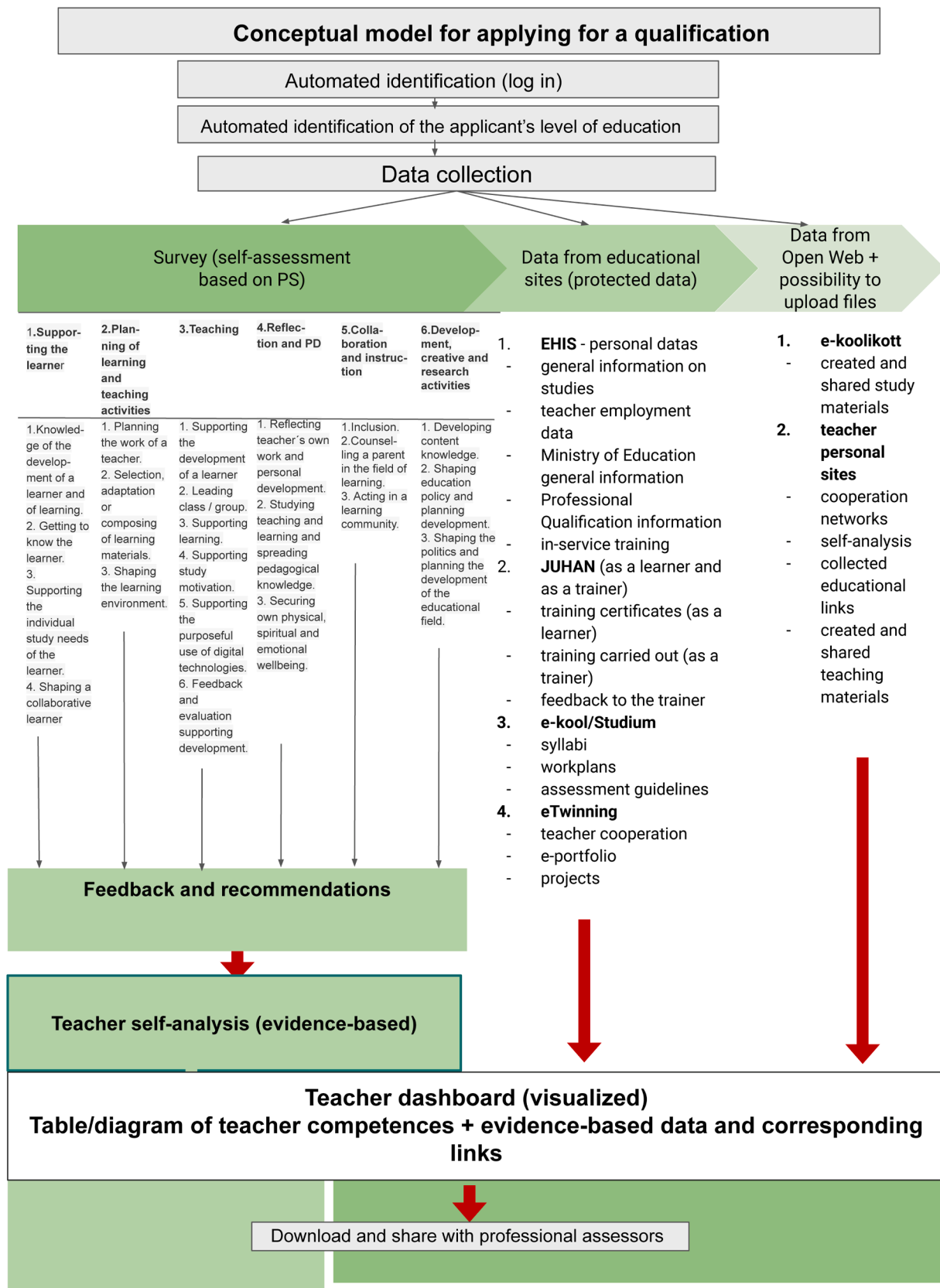


Fig. A3. Conceptual model of the TAPP.

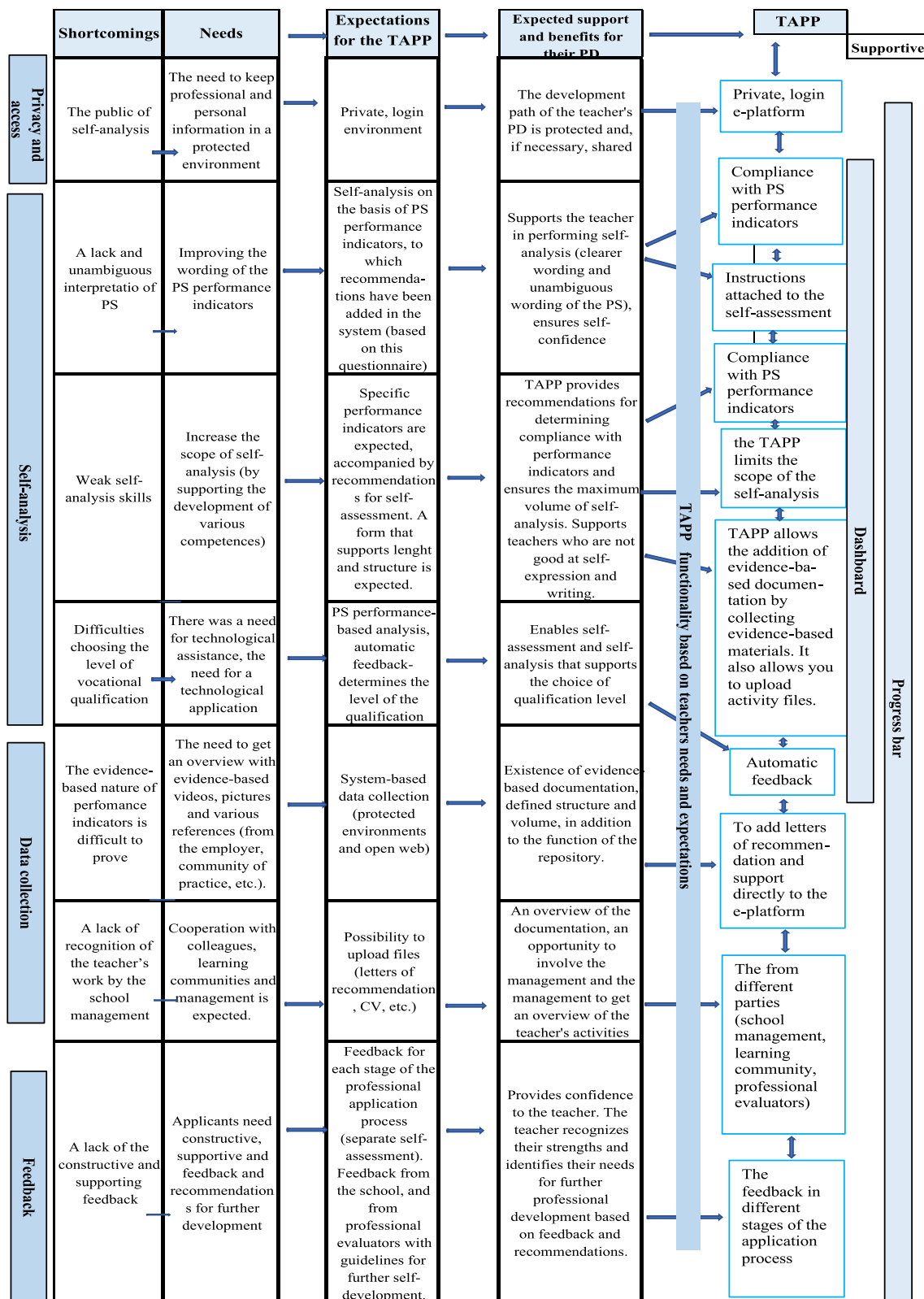


Fig. B.1. The input of shortcomings (Leibur et al., 2020, 2021), needs and expectations for the TAPP.

Length

All target groups positively assessed the fact that the TAPP limits the scope of the self-analysis. It is not the length of the writing that is important for an overview of one's PD, but a specific relevant analysis. It

was found that the in-app form of self-analysis would significantly support teachers by providing a unified volume of writing space for all.

... it is not necessary to write for the sake of writing, but make sure 1. I have assessed myself; 2. these are my evidence documents; 3. I have my self-analysis added to the performance indicators (D1)

Also, they considered it important that the current narrative e-portfolio could be replaced by a form of self-assessment based on performance indicators of PS provided by the TAPP. This would ensure the maximum relevance of the analysis. This option would alleviate the concern of teachers with inferior literary and self-expression skills about how much and what they should write for self-analysis.

In this case, the need for an e-portfolio would disappear, because not all people are good at writing. For some sentence formation is extremely difficult. Currently, the portfolio is still blog-like. (TA1)

In conclusion, the self-analysis within the TAPP would provide an overview of the level of PD of the teacher and also highlight the developmental needs.

Such self-analysis would show me where I am, what I am missing and where I need to go. It's the kind of impartial machinery I wouldn't be angry at. I may be offended by a person, but if the TAPP tells me what the situation is, there is no point in arguing (TA2)

Data collection

Target groups considered application-based automatic data collection important. The TAPP would collect data from both protected databases and the open web.

The TAPP collects links and evidence-based materials related to the person and then you simply add them to your self-analysis and submit them to the Professional Evaluation Committee. (TA3)

Such data collection saves time for teachers / applicants and at the same time allows to select the data necessary for themselves.

The degree of evidence

The target groups found it useful that the TAPP allows the addition of evidence-based documentation by collecting evidence-based materials. It also allows you to upload activity files.

Evidence-based is very important. Teachers claim that they do something, but have no documents to prove it. (A)

... TAPP allows concreteness, evidence based, description is also a proof. (D, A)

As an important supporter of PD, all target groups also pointed out the possibility of TAPP to add letters of recommendation and support directly to the environment itself, by which the management or community certifies the teacher's activity. Thus, TAPP would allow cooperation to be demonstrated.

One or two letters of recommendation could still be, and documents proving what the person has done. For example, work planning needs to be proven. The proof is still over the top. (A)

All 4 target groups pointed out that self-analysis in a protected environment, supplemented by evidence-based material collected by data collection or uploaded by the teacher, which is very important for teachers. The TAPP would allow you to update your documentation at any time and maintain all versions of one's self-assessments, which would be of great help to teachers in monitoring their PD and creating their professional history.

Feedback

The feedback is seen as an assessment that supports the teacher which also includes recommendations for further self-development. The TAPP would provide both automatic feedback and verbal assessments.

The feedback gives me support as to whether I am on the right track, what competencies I could still develop. (T1)

All target groups found that the speed of feedback in different stages of the application process (self-analysis, evidence-based) and from different parties (school management, learning community, professional evaluators) would be supportive and necessary for teachers.

The feedback supports teachers and gives them more confidence (T3).

Constructive and supportive feedback raises teachers' self-esteem - teachers get a confirmation as to what they are really good at.

Supportive functions

We analyse how the additional functions expected from the TAPP would support the PD of teachers and the application process: a progress bar and dashboard.

All 4 target groups found that the TAPP would allow teachers to use the completed self-analysis format for development interviews, job applications, etc., as well as to monitor their PD.

Assessors and teachers involved in the development of PS pointed out that the TAPP would be important in re-applying for the profession (senior teachers and master teachers). The TAPP would ensure that for re-application the documentation would be presented in one environment, as well as allow teachers to gain an overview of their PD (when and how they have developed their strengths) and to monitor their progress.

Dashboard

The dashboard provides a quick graphical overview of teachers' competencies. Teachers also get an overview of their strengths and competencies in the form of a diagram showing which aspects still need to be developed.

... the visualized competence indicators as a diagram - this would be a figurative overview of the teacher's PD (T3)

It would also give them a better overview of their strengths that they may not be noticing in their daily work (T2)

The visual dashboard would support and enable the interpretation of teachers' PD as their personal competence profile.

Progress bar

The progress bar was considered important in gaining information and insight into the various parts of the profession application process. The possibility to use the progress bar would be particularly useful for the first-time applicants, for whom applying for a profession is a novel activity.

The progress bar shows the performance of the activities. It shows how many activities have been performed, how much more needs to be done - provides an overview of the necessary documentation. (TA, T, A, D). It would help the applicant a lot (A1)

This function would also support the whole process, moving from one stage to another (self-assessment, self-analysis, adding evidence-based materials and submitting to a peer review panel), thus providing teachers with an understanding of the logic of the process and give them confidence.

Discussion

The main goal of the research was to identify teachers' needs and expectations, and based on these to design the prototype of the TAPP (technical application) that supports teachers' PD and the application process. The assessment of professionalism (self-assessment as an assessment of conformity to a profession) is a very complex and multifaceted process, thus various measures and data sources are needed for an effective assessment process (Broad & Evans, 2006). Therefore, the practical value of the study is the validation of the data and input required for the development of the TAPP model (Appendix B). As a result of this study, the expectations of different target groups on the functionality of the TAPP and the expected benefits for supporting the PD of a teacher (self-assessment, determining the need for in-service training and receiving feedback) were identified.

The TAPP is designed to focus on the formation of a professional identity, to support self-efficacy, decision-making ability and also guide

the teacher to make further professional decisions (Beijaard, Meijer & Verloop, 2004). Nevertheless, this conceptual model still requires validation and testing (which is the goal of subsequent studies).

This study aimed to support the development of a learning professional (Pedaste et al., 2019; Ruijters & Simons, 2014), paying attention to continuous self-improvement, critical self-analysis, acquisition of new knowledge and skills, and cooperation. According to this concept, the aims of professional teachers are expressed in their aspirations for continuous professional development (lifelong learning) in order to keep up with changes, and stay in their job, to have and also to improve their qualification. The objectives of professionalism coincide with the purpose of the technical application that is implemented to meet the expectations of teachers. In order for professional teachers to achieve their goals, they must have certain qualities and meet the requirements of the position (Pedaste et al., 2019). Thus, teachers are expected to commit to their work, demonstrate responsibility for their activities, and be included in continuous self-analysis and self-development. The findings of this study revealed the teachers' interest in their professional development and need for its constant observation, so from the perspective of professionalism we can estimate teachers' expectations regarding their qualification level, existing competencies and knowledge. Teachers need a self-analysis format with specific guidelines to identify their knowledge and developmental needs (Hammerness et al., 2005) and to analyse their professional collaboration with their colleagues (work in learning communities, etc.). They also need the possibility of automatic data collection, which ensures the existence of evidence-based documentation as teachers have to prove that they meet the criteria of the professional standard and their competence.

The TAPP (Fig. A3), which was designed based on input from target groups, would allow data collection and storage in protected system. The system collects the evidence-based data from protected vocational sites and from open web needed to apply for the teaching qualification. This functionality was estimated by the interviewees time- and energy-saving option. After that, the teacher would be able to apply for the qualification.

The TAPP supports the observance of PS performance indicators in self-analysis, helps to manage the volume of self-analysis and organizes its structure. Thus, the TAPP allows to analyse and assess the level of PD of the teacher, to provide both automatic and oral feedback and recommendations for further professional self-development. The TAPP supports the most important goal of self-analysis - making new knowledge and making informed decisions that influence teachers' values and attitudes (O'Farrell, 2007).

The TAPP is necessary for teachers to get an overview of their PD, acquired competencies, and enables to analyse them (Guskey, 2003). The TAPP also allows to identify one's developmental needs through self-analysis and to determine the need for further in-service training (Hattie & Timperley, 2007). Thus, the TAPP would change the efficiency of applying for the profession: rapid feedback from professional colleagues (assessors) to the professional activities of a teacher (Ingvarson, 2002) and support in teacher professional learning and self-improvement (Ruijters & Simons, 2014).

For teachers, feedback from the whole application process is very important. Feedback through scales and diagrams (teacher visual dashboard) helps teachers to analyse their competencies and monitor their PD with the aim of achieving greater professional mastery (Marzano, 2010). The dashboard visually displays the information the teacher needs, gathered on a single screen, allowing for quick overview and intervention. Feedback with evaluators' recommendations to support teachers in setting new and higher goals is also important (Hattie, 2009). The TAPP, with its functionality, allows teachers to gain sufficient insight into their PD, allowing them to set new and higher goals to reach the next level of qualification and to continuously analyse their teaching while fulfilling the goal of keeping professional teachers in their positions. It also identifies an effective and personalized professional development path and the teacher's compliance with the

requirements of the profession and personal needs for their self-improvement (Broad & Evans, 2006). The authors of the paper believe that professional self-development is a driving force. It is strongly related to continuous self-improvement, learning from one's experiences and self-analysis, and thereby enables to achieve changes in both work results and the work process.

Limitations

Although it was difficult to find a sufficient number of interviewees, collecting data through focus group interviews provided an opportunity to analyse in detail the expectations of the different target groups. As the study focuses on teachers already involved in applying for a profession, the results may differ somewhat from the expectations of senior teachers and non-professional teachers.

Despite the limitations, the research provides an overview of the expectations and expected benefits of different target groups for PD and the TAPP model supporting the application for a profession. For future research, it is important to involve both practicing teachers and teachers who are yet acquiring teacher education at university. In this case, it would be possible to specify on the one hand the expectations for the TAPP in supporting PD and applying for a profession, and on the other hand the expected benefits of using the TAPP in PD and when applying for the profession.

Conclusion

The study revealed the expectations for the involvement of technology and partial automation of the process (data collection and initial feedback on competencies (compliance with PS performance indicators) to determine the right level of profession, identify self-improvement needs and create a protected environment for self-analysis.

The results clearly show the need for creating that kind of practical application and point out the expected benefits (time, protected environment, data collection, feedback) in terms of teacher self-assessment and self-analysis, as well as in applying for the profession.

The most important part of the TAPP is to offer the possibility of self-analysis. This is based on existing national professional standards for teachers, which serves as a tool for measuring teacher competencies – so, self-assessment is based on PS performance indicators. Such a technical application supports teachers' self-analysis and self-monitoring and provides feedback on teachers' professional development process. This in turn allows the teacher to move on to a higher level of qualification. The functionality of TAPP also supports school management in hiring staff, enabling the level and suitability of the teaching profession to be assessed through TAPP. Such a TAPP is very important in valuing the teachers' work and helping them define themselves as learning professionals, while supporting their professional self-development and self-esteem,

Further research will already focus on the development and immersion of a prototype of the TAPP.

Institutional review board statement

Ethical review and approval were waived for this study, as it involved only adults who all gave informed consent for participation. No sensitive personal data were used in the study.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Declaration of Competing Interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Not applicable.

Appendix A

Interview plan Research Questions Interview Questions Target groups

Appendix A . Interview plan. Research Questions

	Teachers currently applying for the profession	Teachers who have the profession	Professional assessors	Teachers who are involved in developing PS
What are the needs and expectations of different target groups for the TAPP supporting the PD of teachers and applying for the profession?	1. Are the choice of professional level and criteria understandable? On what basis do you plan to choose the professional level?	Was the choice of professional level easy and the criteria easy to understand? What was the basis for choosing your professional level?	Does the applicant always meet the requirements of the chosen level?	Does the applicant always meet the requirements of the chosen level?
	2. Is compiling documentation and carrying out self-analysis difficult and time consuming? What would be the options for simplifying the process?	Was compiling the documentation and doing the self-analysis difficult and time consuming? What opportunities could be found to simplify this process?	How content are you with the documentation provided by the applicants?	How satisfied are you with the documentation provided by the applicants?
	3. How do you gather the evidence? (you search the web, your computer, etc.)	How did you gather the evidence? (you searched the web, your computer, etc.)	How much evidence must be provided?	How much evidence must be provided?
	4. How do you assess the evidence-gathering process? (any problems, what?)	How do you assess the evidence-gathering process? (problems?)	Did the applicants provide sufficient and correct evidence-based material (links, files, photos, etc.)?	Did the applicants provide sufficient and correct evidence-based material (links, files, photos, etc.)?
	5. Do you lack supportive material / technical aids while collecting documentation and writing a self-assessment? What specific support would you need?	In which parts of the application process (excluding the interview) did you lack supportive material / application (help)? What specific support needs emerged?	In which parts of the application process (excluding the interview) did you lack supportive material / application (help)? What specific support needs emerged?	In which parts of the application process (excluding the interview) did you lack supportive material / application (help)? What specific support needs emerged?
	6. Would a technical application that helps determine your compliance with KS competencies as an applicant and provide feedback help with self-assessment?	Would a technical application that helps determine your compliance with KS competencies as an applicant and provide feedback help with self-assessment?	Would a technical application to help determine the applicant's compliance with KS competencies and provide feedback be necessary? Why?	Would a technical application to help determine the applicant's compliance with KS competencies and provide feedback be necessary? Why?
	7. Would a technical application that could also collect various evidence-based data (from the web, Ehis, Juhan, e-school - maybe somewhere else) be helpful to you as an applicant?	Would a technical application that could also collect various evidence-based data (from the web, Ehis, Juhan, e-school - maybe somewhere else) be helpful to you as an applicant?	Would a technical application that could also collect various evidence-based data (from the web, Ehis, Juhan, e-school - maybe somewhere else) be helpful to... 1. you as an applicant? 2. you as an assessor?	Would a technical application that could also collect various evidence-based data (from the web, Ehis, Juhan, e-school - maybe somewhere else) be helpful to you as a developer of PS?
	8. What features should this technical application include? Why?	What features should this technical application include? Why?	What features should this technical application include? Why?	What features should this technical application include? Why?
	9. What kind of environment for self-analysis would you prefer? Public / Protected. Why?	What kind of environment for self-analysis would you prefer? Public / Protected. Why?	What kind of environment for self-analysis would you prefer? Public / Protected. Why?	What kind of environment for self-analysis would you prefer? Public / Protected. Why?
	10. What are your expectations for the technical application (features, how it works, data collection, feedback, etc.)	What are your expectations for the technical application (features, how it works, data collection, feedback, etc.)	What are your expectations for the technical application (features, how it works, data collection, feedback, etc.)	What are your expectations for the technical application (features, how it works, data collection, feedback, etc.)
Which should be the design and functionalities of the TAPP support the PD of the teacher and the application process?	11. What could you benefit from the technical application as a teacher about to apply for the profession?	What could you benefit from the technical application as an applicant?	Could the application also support the evaluation process? What information would the assessor need?	Could the application also support the PS development process? What information would be needed?
	12. How would the application support the PD of the teacher?	How would the application support the PD of the teacher?	What could be the benefits of the application? (1st assessor, 2nd applicant) How would the application support the PD of the teacher?	What could be the benefits of the application for PS developers? How would the application support the PD of the teacher?

Appendix B

Fig. B.1, Fig. A1, Fig. A2, Fig. A3, Table A1.

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