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Changes in Vocational Teacher Training in Hungary: Challenges and Possibilities

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***Abstract*—**The training of vocational education teachers in Hungary was a special training system before the Bologna system, but under the influence of the Bologna system, the structure and content of the training changed significantly. The training of vocational teachers, including engineering teacher and vocational trainers, is considerably different when compared to the training of public education teachers. This study aims to present these differences and peculiarities, problems, and issues of the training as well as to outline the possibilities of further development. During the study the following methods were implemented: empirical research among students and graduates of vocational teacher training, as well as analysis of the relevant literature. The study summarizes the research and theoretical results related to Vocational Education and Training (VET) teacher training over the past 15 years, with the aim of developing the training and mapping new directions in the field.

***Keywords*—**Bologna system, vocational educators, vocational teachers, vocational teacher training,

I. Introduction

THIS section presents master-level VET teacher training before and after the introduction of the Bologna system. Teacher training as a whole is quite versatile and while VET teacher training is distinctive and diverse, there a number of common features that strengthen its unity with teacher training. In vocational teacher education, vocational teacher training and vocational instructor training have retained the duality of the of "vocation-based" and "education-based" requirements and the expectation of professional knowledge as a precondition for obtaining a pedagogical qualification and practicing as a teacher [1], [2].

Another peculiarity of vocational teacher training is that professional, vocational preparation also ensures that the teachers become prepared for several subjects with the qualification of a teacher. This is present at all levels of vocational teacher training, as the whole training fits into the professional structure, following the professional training [2].

Prior to the Bologna process, there were basically 2 models of technical teacher training: the training of technical teachers took place in parallel and in a follow-up form [3]-[5]:

In the parallel (concurrent) training model, technical and pedagogical training runs in parallel throughout the training or over a longer period of time. The main advantage of this model was that it provided a greater opportunity for the gradual acquisition of pedagogical experience, the deepening of motivation for a pedagogical career and the professional organization of pedagogical training content. Various versions of the parallel full-time technical teacher training are present in the Dutch, French and Hungarian college-level technical teacher/engineering teacher training and vocational teacher training systems [6].

In the follow-up (consecutive) training model, the pedagogical training phase (teacher training) begins after the completion of the vocational training phase. This model is still used in many countries for the cost-effectiveness of training and to facilitate subsequent career changes. Its typical implementation can be observed in the training of vocational teachers/craft teachers at university level in Hungary prior to the British and Bologna systems [6].

There was also, in a relatively small volume, a mixed form: students who did not gain the teaching diploma in parallel training (e.g., could not obtain the required credits) could complete their pedagogical studies (obtaining the credits still needed) in the follow-up form. According to the department, the parallel training was full-time and the follow-up training was conducted as distance-learning [7].

The Bologna process transformed the system of professional teacher training and technical/craft teacher training. However, the structural change in vocational teacher education also brought on a change in content.

Engineering teacher training belongs to the field of teacher training, although it is also closely linked to the field of vocational training. The reason for this is that the pedagogical-methodological preparation of engineering teachers is closely related to engineering education, and as a complex technical and pedagogical training, it can only be effective in the environment of engineering education in the future [5].

Following the Bologna model, training within the same field is divided into two cycles as follows:

1. The basically practice-oriented cycle, which helps to gain employment directly, is a bachelor's level (BSc), which means a BSc degree in technical vocational education. This will be replaced by a BA course starting 2021.
2. The basically theory-oriented cycle, which prepares for development-research tasks will take the form of master's level (MA), training of graduate engineering teachers.

The structure of technical teacher training prior to the Bologna system was as in Table I. The situation after the Bologna process can be summarized as in Table II.

Peculiarities of Vocational Teacher Training

The technical teacher training aims to serve several purposes at the same time, so the training runs on several threads. This

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raises the disparities in engineering/teaching. Previously, before the Bologna system, the dual degree was favorable in terms of flexibility of employment, and had other advantages, too, e.g., acquired technical practice, psychological and pedagogical knowledge for those working as engineers, etc. [9].

TABLE I
STRUCTURE OF TECHNICAL TEACHER TRAINING PRIOR TO THE BOLOGNA SYSTEM BASED ON VOCATIONAL AND TEACHER TRAINING QUALIFICATION [8]

Qualification	Teacher training qualification	Teaching qualification and level
M. Eng.	M. Ed.	Master Engineering Teacher (University degree)
B. Eng.	B. Ed.	Engineering Teacher (College degree)
Technician	College	Technical vocational teacher (College degree)

TABLE II
LEVELS OF PROFESSIONAL AND PEDAGOGICAL QUALIFICATIONS IN TECHNICAL TEACHER EDUCATION FOLLOWING THE BOLOGNA SYSTEM

Vocational qualification	Pedagogical qualification	Term and level of teacher qualification
M. Eng.	M. Ed.	Master Engineering teacher (University degree)
B. Eng.	M. Ed.	
B. Eng.	M. Ed.	
B. Ed.	M. Ed.	
Technician/Higher-level course, incoming	B. Eng.	Technical vocational teacher (College degree)
Secondary level/Higher-level course, incoming	B. Ed.	Technical teacher (College degree)

In technical teacher training, specialist training is more comprehensive than training in any other institution involved in teacher training. With a diploma, a technical teacher can teach 10–15 types of subjects in his/her field. Through their comprehensive technical knowledge, the technical educators can adapt well to the high degree of specialization of vocational secondary schools [4].

The subject system of the pedagogical modules of technical teacher training shows great similarities with the training of teachers employed in the teaching of general educational subjects. There are many related elements in the curricula of psychological, educational theory and didactics, although the aspect of negotiation carries with it the technical orientation of the training. The greatest difference is in the material and understanding of professional methodologies. From the very beginning, vocational methodologies in technical teacher training have been an integral part of the pedagogical training module, and in terms of their competence, they have belonged to teacher training departments/institutes/centers. It is still disputed in which direction their attachment points primarily: towards the vocational subjects or pedagogical fields. The development of methodologies taught within the framework of professional departments stops almost always due to becoming out of contact with pedagogical theory, but mainly with pedagogical practice [9].

Engineering Teacher Education in the University of Dunaújváros

The University of Dunaújváros commemorated the 50th anniversary of vocational teacher training in 2020: the institution was the first to start training technical teachers in 1970; and in the past 50 years - by developing and examining the training - it has also significantly contributed to the research of technical teachers [10], [11]. The present research, which took place among the students participating in the master's degree in engineering since 2007, fits into this research portfolio.

In 2007, when the institute accredited the engineering teacher study program as one of the first higher education institutions, a new era in education began. Since then, it is well-known that the Bologna system-based teacher training has transformed the whole training itself, and thus the circle of those entering the training has also changed, as has its content and, of course, its perception. The institution has nearly 15 years of experience in engineering teacher-master's training, almost 500 diplomas and final exams have been issued. From time to time, the admission indicators have been examined, but no major statistical analysis has been conducted so far. Following the longitudinal study, the work aims to summarize the evaluation of graduates studying at the institution from 2007 to 2021 and, as a result, to draw conclusions for the training as a whole.

In the first major phase of former college-level technical teacher, engineering teacher training, between 1974 and 2007, 1,190 students successfully completed their studies and earned a college-level degree in engineering; most of them studied full-time (a smaller proportion of them studied via distance learning). Since then, in the new master's program created by the Bologna system between 2007-2021, 451 people obtained diplomas in the MA- Engineering teacher.

In 2014, engineering teacher training was expanded to include no-division/continuous engineering teacher training, although this training did not live up to its expectations over the past decade and a half. Unfortunately, the no-division/ continuous engineering teaching program is a problem for all institutions providing technical teacher training [12].

II. THE STUDY

A. The Subject of the Research

The subject of the research was the examination of the opinion of the master's degree students of engineering teachers of the University of Dunaújváros (and its predecessor institution), i.e., the graduates of engineering teachers.

Evaluating the education and training of an institution is a complex task due to the extremely large number of components and factors. Due to the increasing performance requirements and competition, students and former students perceive education more and more as service-oriented, and they become very interested in its high standards and quality [13].

In parallel with the release of the first graduate generations of the new training structure, the need for feedback became stronger [14]. The subject of the research was developed on the basis of these considerations.

B. The Aim of the Research

The aim of the research was to examine the quality of the

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training based on the data collection carried out among the engineering teachers graduated from the University of Dunaújváros, to make proposals for the renewal of the training, for the institution and the Hungarian vocational teacher training as a whole.

The survey sought to answer the question of how the most important actors, the graduates, perceived the training. The central issue of the questionnaire survey was the professional career and career of the members of the target group.

The open questions in the research were as follows:

1. How desirable is the teaching career for graduates?
2. What factors depend on attitudes towards training?
3. How can the value of engineering teacher training and engineering teacher diploma be assessed (labor market convertibility)?
4. Is there any difference and if so, what is the difference between the groups of graduates in training in 2007-2020, i.e., graduates in 2009-2021, in terms of opinion on training?

C. Research Methods

The time of the research was set for the date of obtaining the master's degree, i.e., the interview took place just after passing the final exam, between 2009 and 2021. During the nearly 15 years of training, all students in the final exam were offered the opportunity to complete the questionnaire, but participation in the study was voluntary, as was the information extracted from the questionnaire: anonymous. We are grateful to report that out of the 468 students who studied at the institution between 2007 and 2021, 306 questionnaires were collected for research purposes during the longitudinal measurement, showing a response rate of about 65%, which allows conclusions to become general conclusions.

The data were processed with the tools of descriptive statistics, during the exploration and evaluation of deeper correlations with the methods of mathematical statistics. The processing was performed with the help of the SPSS social science research program.

D. Research Tools

The same questionnaire was used in the study for all graduate groups, which could be divided into several question blocks in terms of structure:

1. background variables, basic data of students - gender, age, county of residence, type of settlement, time of university studies, language skills
2. preliminary higher education
3. assessment of engineering teacher training (modernity, building on each other, applicability of knowledge, training reform proposals)
4. assessment of competencies for professional competence, work performance and communication skills
5. work information
6. a review of past careers and future plans

E. Background Variables

To evaluate the results of the study, the following conclusions can be drawn by briefly summarizing the basic information. Nearly 80% of respondents are men, while one-fifth are women. From the specializations of engineering teacher training (informatics, mechanical engineering-mechatronics and formerly specialization in materials engineering-engineering) this was definitely expected. Further, previous studies [15], [16] may predict the fact that the field of professional teaching is still the field of training where male surplus is typical.

Examining the age of those who completed the training (at the time of the interview) by age group, it can be seen that the majority of the students of the training were between the ages of 26-30 and 31-35.

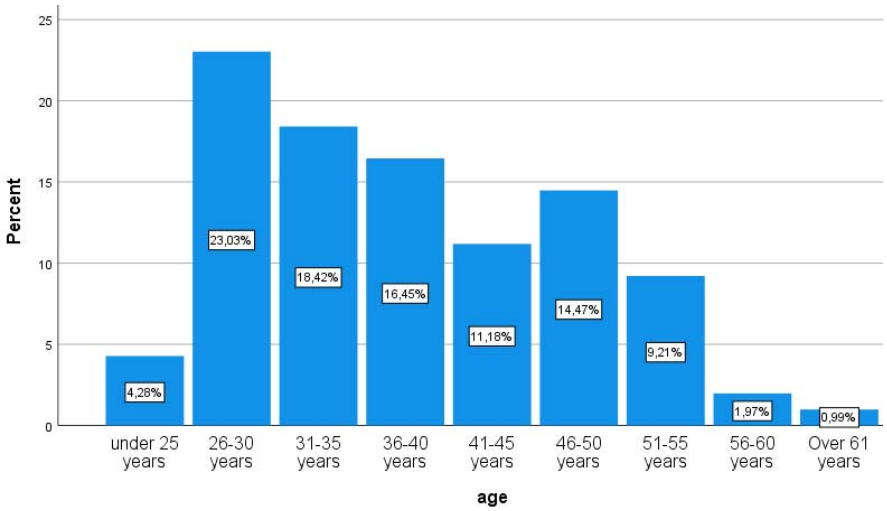

Fig. 1 Age distribution of the respondents

If the age and the year of enrollment are compared, there is a correlation between the two, namely the number and proportion of students under the age of 40 was higher at the start of the training, while in the last 5 years (from 2016) this ratio was higher than the age of 40 and shifted in that direction. This is also due to the fact that as a new and at the same time the first

university training, former students who had previously graduated full-time at the institution with a degree in engineering from the college returned to this training.

Most of the respondents studied in the state-funded form of training, about 80% of the respondents, while 12% were fee-paying students, but some of the respondents indicated that they continued their studies in both forms of funding. The latter is mostly a characteristic of the graduates of the last period, the last 5-6 years, its mild correlation value also indicates this (r = 0.117). However, this is certainly also related to the increasing age of the entrants.

Regarding their place of residence at the time of the answer, the respondents came mostly (56,4%) from the vicinity of the institution, the explanation of which stems from the interregional situation of the training institution, as a meeting point of several counties and the nature of a transport hub.

The former students are primarily urban dwellers (71.3%), with less than a third of them living in rural areas.

In terms of their secondary education, most of them (67,11%) held a traditional vocational high school diploma, confirming the fact that the basic supply base for vocational teacher education is former students of vocational education, about two-thirds come from this type of institution, while the rest mainly attended grammar school.

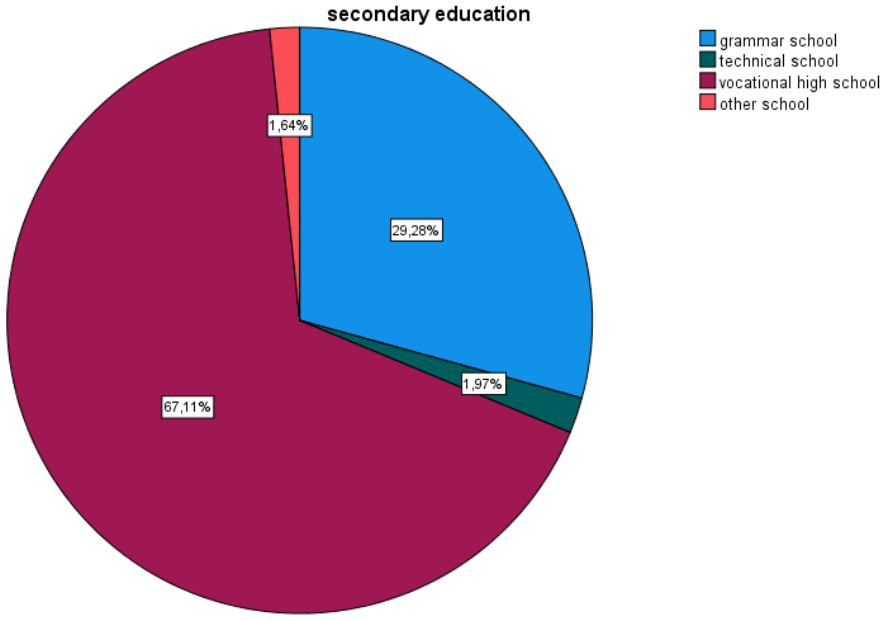

Fig. 2 Secondary-school studies

Another research question was where they had obtained their higher education degree before their studies at the institution, to which 27% of the respondents replied that they had acquired their prior knowledge of engineering/engineering teacher/ vocational teacher at the University of Dunaújváros, which is the current input of their studies, given that engineering teacher training provides entry for multiple degrees. At the time of graduation, a negligible 3% of them pursued other higher education studies at other higher education institutions.

An interesting piece of basic data of the survey was whether and what level and type of foreign language knowledge they had and what language they could relate to. Regarding the latter, the superiority of the English language confirmed, indeed, as expected, with about 58.8% of them, followed by German, but it can be stated that there is a small number (4.5%) who speak several languages.

63.7% of the students have a language exam, 86.4% of them have a complex language exam, however, only 55.8% of them have an intermediate-level language exam, while 40% of them have a basic-level language exam and 3.9%, i.e., 7 of the respondents have advanced-level language exams.

III. Training Success, Assessment and Usefulness of Training

The graduates surveyed clearly considered the pedagogical knowledge acquired in the master's degree program to be up-to-date, regardless of the date of graduation, 96.7% of them stated this; and similarly, 94.3% considered it appropriate to build on each other's theoretical and practical subjects.

The questions were further examined in the form of open questions. Most of their answers mentioned the up-to-dateness and modernity of knowledge, followed by the modern teaching methods, then practice-orientation, modern tools, and flexibility, progressivity, etc. And only 5 dissatisfied responses were received regarding how non-useful their degree was.

In terms of materials building on each other, the logical arrangement of materials, consistency and the rate of theory-practice received the most mentions in open questions, followed by the emphasis on methodologies and the teachers' competencies. While the lack of materials building on each other was also mentioned in several cases, but then it was consistently mentioned in all areas: professional internships, professional subjects, and pedagogical subjects.

Examining the gaps in knowledge, most respondents (51.8%)

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stated that they lacked technical knowledge from the training, while a significantly smaller proportion stated in the survey that they failed to gain in economic and social science knowledge.

A. Details of Measuring Satisfaction: Education Elements

The applicability of the gained knowledge was one of the most important issues in the series of studies. The question is also important because in this round there was no prior knowledge of what position the respondents held, what type of workplace they worked in, whether it was in a school or corporate setting.

Based on the answers, 75% of the former students felt that the professional knowledge learned in the MA program was fully applicable, 23% considered it partially applicable, while 2% did not find it applicable at all. This question was worth being subjected to deeper analysis, which highlighted that those respondents who were fully satisfied with their obtained professional knowledge were also more satisfied with the study programs offered by the institution, which showed a strong correlation (r = -0.449).

The same correlation can be seen in the case of satisfaction with the knowledge transfer method of the subjects and the educational methodological standard, (r = -0.402) along the medium correlation strength. At the same time, there was no correlation with the question of whether they would choose the career of a teacher again, i.e., regardless of their intention to enter a teaching career, whether they considered the professional knowledge learned within the MA training as useful and applicable or not. Regarding pre-Bologna engineering teacher training, this was evaluated differently by previous studies [5], where there was a strong correlation between the assessment of training and the entry into a teaching career and/or avoidance of such.

The question was also worth comparing with regard to how up-to-date the pedagogical knowledge was, and there was a correlation in this case as well (r = 0.232); according to the respondents, the modernity of pedagogical knowledge was correlated with the usability of professional knowledge. At the same time, examining the building of the subjects on each other, there was no longer any connection between them.

An important dimension of knowledge applicability in the study was whether there was a difference between students, i.e., whether it depended on some other variable, whether it was considered more useful, more important, more valuable. It can be seen that there were differences in the groups of graduates, there was a small correlation (r = -0.229) based on the year of graduation and the evaluation of applicability. This was confirmed in a cross-tabulation analysis that among the graduate groups, until 2011, there were those who could not utilize their knowledge at all or in part, while most who graduated since then considered their education was fully applicable. The latter was also confirmed by the Kruskal-Wallis test.

Following the previous question on knowledge applicability, it was also important to explore what knowledge they lacked or considered necessary for performing better at their jobs. A total of 20% of the respondents indicated a deficiency.

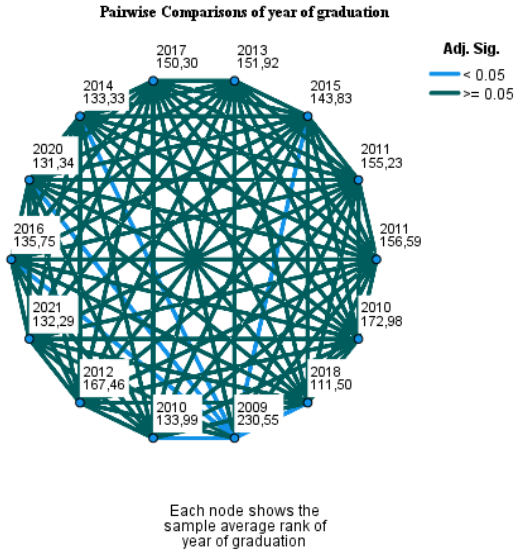

Fig. 3 Applicability of knowledge in studies according to the year of graduation

Respondents were satisfied with the study program offer of the institution with an average value of 5.25 on a scale from 1 to 6, with a standard deviation of 0.775. This is considered an outstanding rate.

Compared to the year of graduation, satisfaction with the institution's offer was found to be less satisfactory for those who graduated between 2009 and 2011, while those who graduated after 2011 rated the training offer as better. This finding was also confirmed by the Kruskal-Wallis test.

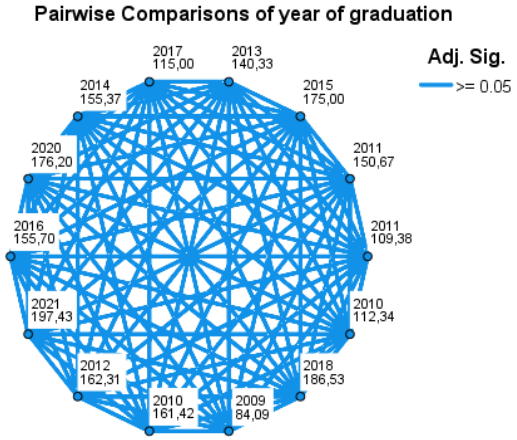

Fig. 4 Satisfaction with the institution's offer according to year of graduation

While the standard of knowledge transfer in their subjects resulted in an arithmetic mean of 5.16, it could be summed up with a standard deviation of 0.818 based on the responses. Here, too, the Kruskal-Wallis test was performed, which also showed a correlation between the year of graduation and the answers to the question, but this correlation was not as strong as it was in the previous question.

It was much appreciated that the former students stated they would be ready to return to their alma mater to study in the

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future as well, as confirmed by several DPR studies (DPR is the Graduate career tracking system in Hungary) [17]. In the present study, it was also found that nearly one-third of the graduates would return for some additional training. In the answers to the questions, there was also a correlation between the intention to continue learning and the satisfaction with the study program offer provided by the institution. This led to the obvious conclusion that if they were satisfied with the offer, they were expected to be among the potential students in their subsequent courses as well.

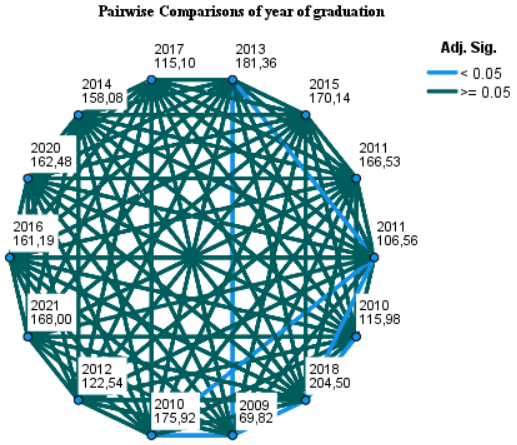

Fig. 5 The knowledge transfer standard of their subjects according to the year of graduation

The study also examined what the respondents expected in the future, based on their own abilities and career traits, in what jobs and positions they would be working in five years. In their answers to this open-ended question, they referred to themselves as teachers or vocational teachers, and these two instances could be treated separately in the question analysis.

In addition to professional and/or pedagogical fields, senior positions have also emerged, as has higher education or corporate education, which, together with adult education, has gained ground in recent years for teaching engineering positions.

Further, the study sought the answer to the question of what field they would work in if they could start their careers over, deliberately separating the pedagogical and professional fields, but also displaying them together. Interestingly, there would be almost the same proportion of teachers (non-professional), engineers or engineering teachers/professional teachers, and only 5.6% would choose a completely different profession. This can be the result of their successful career socialization as well as the success of the training of the institution, the effectiveness of the training, the benefits, and the added value of the institution.

III. Conclusion

The examination of EA's training success became important in higher education, especially following the turn of the millennium, when career-tracking examinations appeared, and then the system of graduate career-tracking developed in Hungary. However, rankings are not novel features in higher education, many regions of Europe and the world have ranked higher education institutions since the second half of the 20th century on the basis of their relevance, added value, even their prestige [13]. These rankings are now essential, not only for the orientation of applicants, but also for determining the market conditions of higher education as a whole, from the possibility of funding to the labor market.

The basic interest of educational institutions is therefore that the value of the diploma issued by them should be decisive, measurable, and position itself as well as possible in a good market position in terms of both the institution's and the institution's training places, both nationally and internationally.

It has often been stated that development is essential for survival, which also refers to the case of individual training. Hence, there is a considerable need for self-examination from time to time and examine the past period. This guided the review of the nearly 15 years after the Bologna system of the master's degree in engineering teacher training in Dunaújváros, and the consideration of the 50 years spent in vocational teacher training.

Following the series of studies, which covered a data collection process between 2009 and 2021, many useful findings worth considering can be made, in many cases not to the outside world, but to help rethink internal training and curriculum issues, however, analytical follow-up of vocational educators through feedback is certainly worth presenting and recommending to other professionals.

References

[1] A. Benedek, Gy. Molnár, "A műszaki és humán szakterület szakmai pedagógusképzésének és képzők hálózatának fejlesztése". A. Horváth H. Attila, Gy. Jakab *A tanárképzés jövőjéről*: 3. kötet, Budapest: OFI. 2015 Pp. 97–105.
[2] K. Rádli, "Szakmai tanárképzés és oktatáspolitika". *Szakmai tanárképzés: múlt – jelen – jövő*. NFKK Füzetek 7. Budapest: Aula 2011.
[3] B. Tóth, *Kilenc európai ország műszakipedagógus-képzésének összehasonlító vizsgálata*. Budapest. 1995.
[4] B. Tóth, "A mérnökpedagógia kihívásai a XXI. században". *Szakképzési Szemle*, 2000/1. Pp. 64–70.
[5] A. Bán Anetta "Eredmények, problémák és teendők a mérnöktanár-képzésben egy beválásvizsgálat tapasztalatai alapján". *Szakképzési Szemle*, 2006. 22. (2.) Pp. 195–207.
[6] B. Tóth, *A műszakipedagógus-képzés fejlesztése*. Vác: Ligatura.1999.
[7] B. Tóth, *Néhány európai ország műszaki pedagógusképzésének összehasonlító elemzése*. Vác: Ligatura 2000.
[8] L. Varga, "A szakmai tanárképzés fejlesztése". In: *Új szakképzési modell (Tanulmányok)*, Budapest: General Press. 1996 Pp. 237–253.
[9] B. Tóth, L. Varga, *Mérnökpedagógia*. http://gep-ujsag.fw.hu/01sep/toth/tbvl.htm (2005. 01. 12).
[10] L. Molnár, *Összefoglaló jelentés: A kooperatív hátterű (IH) kísérleti üzemmérnök-képzés beválásvizsgálata című témához*, Dunaújváros: Nehézipari Műszaki Egyetem Kohó- és Fémipari Főiskolai Kara 1984.
[11] L. Molnár, *Az elmélet és a gyakorlat viszonya a magyar műszaki felsőoktatásban.* Dunaújváros, 1987.
[12] Gy.Gubán, L. Kadocsa, "A műszaki pedagógusképzés fejlődése a Dunaújvárosi Főiskolán" 1970-2015 A. Bacsa-Bán, *Mérnöktanár: tradíció és modernitás: A 45 éves tanárképzés jubileumára*. Dunaújváros, Magyarország: DUF Press, 2015. 11-24. p.
[13] Gy. Fábri, "A felsőoktatás munkaerő-piaci visszajelzései, a kutatások tükrében". *Magyar Felsőoktatás*, 2001/3. Pp. 33–34.
[14] I. Polónyi, "Pedagógusképzés – oktatásgazdasági megközelítésben". *Educatio,* 2004/3. Pp. 343–358.
[15] A. Bacsa-Bán, "A szakmai pedagógusok (pedagógusi) pálya elhagyásának vizsgálata több dimenzióban" *Opus et Educatio: Munka és*

Nevelés 2019. 6: 2 pp. 257-269. Paper: http://dx.doi.org/10.3311/ope.312, 13 p.

[16] A. Bacsa-Bán, "A szakmai pedagógusok (pedagógusi) pálya elhagyásának vizsgálata több dimenzióban II.: Empirikus vizsgálat a szakmai pedagógusok körében" *Opus et Educatio: Munka és Nevelés* 2019. 6: 3 pp. 351-371., 21 p.

[17] A. Bacsa-Bán, I. Juhász, *A Dunaújvárosi Főiskola 2010. és 2011. évi DPR kutatásainak összefoglalója* Dunaújváros, Magyarország Dunaújvárosi Főiskolai Kiadó,2012.

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