

Article

A Qualitative Assessment of the Pedagogical Process at Czech Public Universities

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Abstract: Quality is currently an often-used term in all areas of human activity. However, the measurement of quality is very problematic in the field of education, particularly if no specific, comprehensible criteria for its measurement, accepted by most subjects active in the specific sector, exist. Monitoring quality in the field of education is difficult because there is no long-term embedded quality standard and the established level can be affected not only by the selection of the chosen criteria for measurement, but also by determining specific weights when comparing the importance of the chosen criteria. The authors of this paper endeavour to point out one way of assessing the quality of publicly established universities in the Czech Republic during the academic years 2011/2012 and 2018/2019 on a basic sample of all 26 publicly established universities. The quality of the pedagogic apparatus and the converted number of students indicate that the classification of schools into categories according to the Ministry of Education, Youth, and Sports of the Czech Republic (MEYS) is possible, but the individual categories should be discussed and modified according to the assessment performed.



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Keywords: education; quality; universities; Czech Republic

1. Introduction

The education sector is one of the most important public sectors and is included in the development services sector within the terms of the national economy and also among nonprofit organisations. A common trait of nonprofit organisations is that they are not primarily established for the purpose of generating a profit (even though they may report a profit), but for the purpose of providing services to broad sections of the public, and are mostly financed from public budgets. According to the Czech Statistical Institute, the greatest number of nonprofit organisations in the Czech Republic are registered in the spheres of education, culture, or social services. Their objective is to encourage the economic growth of the country, maintain and cultivate human potential, and provide high-quality services to the population.

However, the quality of services is very difficult to measure, particularly in a non-market environment and with the missing prerequisite of economic or other measurable outputs (inputs can be measured). The term “quality” is most often used to identify something that is optimal, desirable, or ideal, or meets a specific standard. Monitoring quality (not just of tuition) is generally considered relevant from the viewpoint of the top management of an organisation and also from the viewpoint of its founder or providers of funds (donors). Quality is of interest not only to consumers of services (pupils, students, and their parents), but the outputs should also be important to pedagogues (particularly teachers), employers, and politicians, whose steps decide on the state’s educational policy in the long-term horizon and who should strive to require, guarantee, support, and increase the quality of tuition. This itself assumes that a standard (assessment reference framework) will be defined and observed in the long term, with measures implemented leading to remediation in the event of an undesirable (negative) finding. The quality of

services provided by individual organisations, public universities in the Czech Republic (hereinafter “PU”), can therefore be evaluated on the basis of various criteria.

The organisations assessed below, all active in the sphere of public university education in the Czech Republic, can provide purely public assets, mixed, and purely private assets. It is therefore natural that the costs for education, which can differ not only due to the long-term economic situation of the country (GDP), but also, for example, due to the historical development of the educational system of the specific country, are understood in terms of an international comparison.

The objective of this paper is to measure the quality of the pedagogic process during the provision of services at publicly established universities in the Czech Republic during the academic year 2011/2012, and to assess any changes in this field in the academic year 2018/2019. For the purposes of fulfilling the set objective, the submitted paper is structured as follows. Section 2 discusses quality, its perception in the educational process, and the approaches to its measurement. Section 3 focuses on presenting tertiary education in the Czech Republic and the method of its financing as the sector on which the executed research focuses. Section 4 defines the objective, the research hypotheses, the basic group of monitored quality indicators, and the method of their verification. Section 5 is devoted to the results of our own research, i.e., the assessment of quality. Section 6 contains a discussion of the results in the context of local conditions.

2. Quality and Its Measurement

The concept of quality is often used in a number of sectors. The answer to the question of “what is quality?” is very problematic, because, in order to be able to state that something is of high quality, there must be agreement on what the minimum acknowledged standard in the assessed area is. Economists most often imagine an effective expenditure of funds under the term of quality, or consider the price of goods or services in relation to the performance. A problem arises in situations when assets and services are provided with no link to the actual market price (for instance, compulsory school attendance), or the provider of the service does not conduct its activities on a profit-generating principle. The additional terms productivity, economy, and efficiency can therefore also be encountered in relation to the concept of quality.

Terhart [1] states that the concept of quality is used chiefly formally, for the purpose of introducing a difference. As a formal category, it allows for a differentiation between the less valuable and the more valuable. In order to understand how valuable things are, the concept of quality must be given content. In other words, the definition of quality is not an issue of the gathering of quantitative evidence as such; according to Terhart [1], it essentially consists in finding and justifying the content criteria. Fend [2] states that the concept of “high quality” fulfils the function of an assessment concept, i.e., objectivising the value or a general quality of some item. The term “excellence” is proposed in the effort to name a level of quality that is higher than high.

2.1. Perception of Quality in the Educational Process

The first research, the objective of which was to establish the cause of a pedagogue’s success in teaching, was carried out roughly from the middle of the 20th century. Within the terms of research, psychometric methods were used to investigate so-called personality paradigms (research on teacher personality), i.e., which personality traits of a pedagogue had a positive impact on pupils and students and their performance. The research indicated that an enthusiastic and open teacher motivated pupils to learn more and perform better than a teacher who did not have these traits.

The concept of the quality of tuition began to appear in the literature in the 1960s, particularly thanks to the works of Carroll [3] and Bloom [4]. Einsiedler [5] states that there has been an effort to compensate for the bias of the approach by focusing only on the quantity of tuition, by devoting attention to the characteristics (of quality), such as the comprehensibility, structuring, and cohesion of tuition, in the background of Carroll's and Bloom's models. Carroll [3] worked with the factors of time needed to learn and time available to learn. The lower the quality of tuition, the more time the pupil needs to learn. In his concept of tuition and its quality, Bloom [4] took into consideration not only the cognitive performance of pupils, but also the motivational and affective objectives (interests, standpoints, motivation, and self-perception). Quality can be defined variously, even within the terms of the teaching process or the assessed teaching level (primary, secondary, or university). Harvey and Green [6] provided a definition of quality in their work, for instance. Research examining the relationship between the teacher's behaviour and the performance/results of pupils is presented, for example, by [7–9].

Janík [10] states that addressing the topic of quality in education requires courage. A discussion about what is qualitatively good cannot avoid the themes of what is not qualitatively good. In other words, a discussion about quality will only make sense if it also includes a discussion of poor quality, or the standard on which there is a consensus. Weinert et al. [11] stated that the quality of tuition can be defined like "any stable mode of behaviour, which enables substantial prediction as a whole or by means of individual components." According to Martensson et al. [12], good (high-quality) tuition is considered to be tuition that leads to excellent learning results on the part of the student.

Rýdl [13] points out that the concept of quality in education is subjective, often defined by immeasurable and vague phenomena as compared to existing standard quantitative methodological procedures. Starý and Chvál [14] stated that the formula "emphasis must be placed on the quality of tuition" often appears within the terms of the educational process, which applies to the high quality of tuition—as defined, for example, by Průcha [15]. In this regard, Janík [10] stated that quantitative and qualitative methodologists clash on an academic level, with regard to the orientation towards hard versus soft indicators when measuring the quality of education.

2.2. Approaches to and Measuring Quality in the Educational Process

Terhart [1] stated that a school that supports normative designations, implements these in its programme, and fulfils them in its work is considered a "good school." The normative approach to the definition of quality consists in determining and justifying the roles of education, as an institution in society. During this time, decisions are made about what effects of education can be considered an expression of higher quality.

On the contrary, the analytical approach is based on an examination of the various concepts of quality and their use in discussions about education. This is about deriving the perception of the quality of education from an analysis of discourse about a specific period or a specific (governing) educational culture or tradition. The analytical approach can be seen, for instance, in the works of Harvey and Green [6], who defined five different but mutually related concepts of quality on the basis of an analysis of the methods of perceiving quality:

- quality as uniqueness,
- quality as flawlessness,
- quality as effectiveness,
- quality as an adequate countervalue, and
- quality as transformation.

The work of Jürgens [16], who analysed discussions of reform pedagogy in the context of the quality of education, can serve as another example. Pupala [17] stated that it is very difficult to come to a unified understanding of the concept of quality in education, because various actors define quality differently.

Another way to assess quality is by means of an empirical approach, where attention is focused on the actual impact of educational institutions, which is placed into context through their official roles. Mincer [18] stated that this approach can be applied, for example, when measuring the unemployment rate of university graduates. The empirical approach focuses on proposed goals, available resources, programmes used, and effects achieved. On the basis of the above, it is possible to determine the relationship between costs and revenue and to approximate the economic perception of the concept of quality as closely as possible. An example of research that allows for the differentiation of effective schools from less effective schools on this basis is TIMSS research. TIMSS (Trends in International Mathematics and Science Study) research is organised by the International Association for the Evaluation of Achievement and focuses on evaluating the knowledge and skills of pupils in various types of school in terms of mathematics and natural sciences.

On the contrary, PISA (Programme for International Student Assessment) research is an expression of the determination of OECD (Organisation for Economic Co-Operation and Development) countries to monitor outputs from the educational systems of individual countries in terms of an international comparison, on the basis of measuring the educational results of pupils. This research focuses on the reading, mathematical, and natural science literacy of 15-year-old pupils, usually at the end of their compulsory school attendance.

There are a number of studies devoted to the issue of the quality of educational institutions: for instance [2,10,19–27].

3. Key Parameters of Education in the Czech Republic

In the Czech Republic, education is a public asset with collective consumption, which has positive social benefits. It is a preferred public asset, in whose consumption the state is interested. This is usually evidenced by the greater expenditure of funds from public sources in proportion to the GDP of the country. A 2016 OECD study that maps the state of education in the most advanced countries in the world (OECD countries) indicates that the Czech Republic expends an average of approx. 3–4% of its GDP on the field of education in the long term (Table 1).

Table 1. Budget of the Ministry of Education, Youth, and Sports of the Czech Republic in 2010–2020.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TR	2.01	6.15	1.51	1.78	1.23	7.18	8.11	8.64	7.19	10.15	12.28
TE	125.2	127.0	137.8	140.4	137.3	135.9	142.3	156.5	176.1	205.7	226.4
SH	3.34	3.33	3.53	3.62	3.45	2.86	2.88	3.03	3.18	3.50	3.87

TR—Total revenue (in billion CZK), TE—Total expenditure (in billion CZK), SH—Share of MEYS chapter expenditures in GDP (%).

The average expenditure on education of all OECD countries is 5.2% of the GDP. The proportion of public and private funds invested into the educational system differs in individual countries, but public funds usually predominate and account for, on average, 83% of total expenditure on education in OECD countries. This percentage is reported as 87% in the Czech Republic.

Expenditure in the field of education is, on average, 11.6% of all public expenditure in OECD countries. At 8.9%, the Czech Republic is similar to countries such as Hungary, Italy, and Spain in this area and these also reported values of around 8%. In the past three years, the percentage of expenditure on education has increased, which is the result of more funds being funnelled into wages, particularly in regional education. Regional education in the Czech Republic consists of pre-primary, primary, and secondary level education according to the ISCED, on which a total of CZK 161.5 billion was expended in 2020. The decision to fund individual levels of the educational system differs in various countries and is the result of a political decision.

3.1. Funding of Tertiary Education in the Czech Republic

In the Czech Republic, education on a tertiary level at public and publicly established universities is funded from multiple sources and is free for the time being. The main sources of funding of public universities, which are established on the basis of specific laws, include subsidies from the budget of the Ministry of Education, Youth and Sports of the Czech Republic for activities, funds from scientific research activities, funds from various European funds, and own sources from business activities and donations. Financing from EU funds is also among the sources of funding.

Of the annual volume of approx. CZK 225 billion expended from the budget of the Ministry of Education, Youth, and Sports of the Czech Republic on education in 2020, 21.2% of expenses (a total of CZK 48.4 billion) was expended in the field of tertiary education; of this, CZK 21 billion went into the field of research, development, and innovation (approx. CZK 7.1 billion from programmes cofunded by the EU) and CZK 27.4 billion was for funding university education, particularly 26 publicly established universities, which are compared below in terms of the aforementioned quality of pedagogic and scientific workers (see Figure 1).

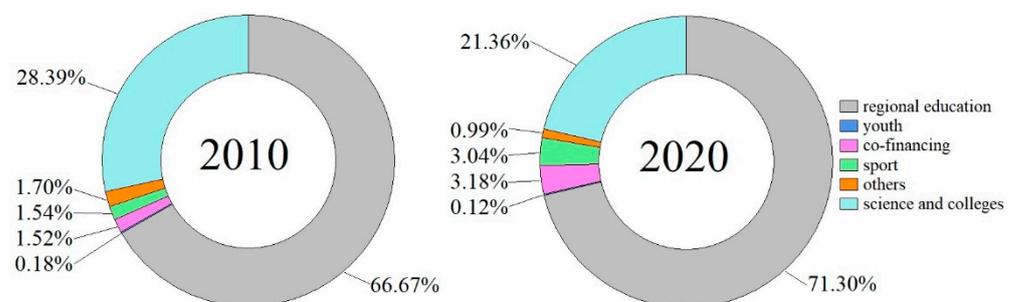


Figure 1. Structure of expenditure by the Ministry of Education, Youth, and Sports of the Czech Republic in 2010 and 2020.

3.2. The Quality of Tertiary Education in the Czech Republic

There are various approaches to the assessment of the quality of university institutions in the available specialist literature. Bloch et al. [28] stated that the concept of “quality” of university education can also be encountered in a number of political declarations, which do not necessarily have to be related to the provision of high-quality performance and measurable outputs on the part of providers of education, i.e., individual universities. The study by Mulder et al. [29] states that the assessment of the work of pedagogues and their students leads to an improvement of the quality of education. Berezvai et al. [30] stated that a better rating of students by pedagogues subsequently leads to a better rating of pedagogues by students. Stewart [31] assessed the influence of the professional growth of university pedagogues on the teaching process. The authors of this paper approach the assessment of public universities below in a similar spirit.

Černíkovský [32] stated that there is no wide-ranging agreement on what the quality of universities means or should mean. Various actors work with various concepts of quality, often not reflected on more deeply and also mutually exclusive in many aspects. The authors of this paper approach the differentiation of the “quality” of university education in the Czech Republic according to the areas of pedagogy, scientific research, and accreditation activities.

Standards of quality within the terms of accreditation activities were established in university education in the Czech Republic in the 1990s, when the accreditation of study programmes was officially implemented on the basis of University Act No. 111/1998 Sb. The act established a national agency with the title of “Accreditation Committee”, which was granted the competence and authority to grant accreditation for all levels of university studies, including the granting of rights to carry out rehabilitation and professorial

proceedings and their subsequent qualitative assessment. Cardoso et al. [33] questioned whether national agencies, which require a specific standard of “quality” for accreditation of university education in Europe, are actually capable of promoting an increase in the quality of education and stated that this remains an open question for discussion.

The competence of the Accreditation Committee in the Czech Republic was assumed by the “National Accreditation Office” [34] in 2016, on the basis of an amendment of the University Act. This organisation also newly discusses the granting of so-called institutional accreditation. On the basis of this accreditation, the university can subsequently approve new accreditations within the terms of the institution, on the basis of an established “Committee for internal assessment,” for a period of 10 years, as well as changes to the accreditation that has already been granted. In this area, we can state that a number of set criteria are given vaguely and interpreted and assessed variously when executing accreditation files. The monitoring and reporting of some indicators is also difficult to understand, and universities consider this unnecessarily demanding from the point of view of the administrator. Tesar [35] stated that not enough research has been carried out yet in order to be able to state that the accreditation system itself will lead to increased quality.

However, according to the authors, the greatest problem with assessing “quality” at universities is in the field of assessing pedagogic activities. It would be desirable to focus more attention on these activities on the level of the management of individual universities and on a national level. The result could and should be a more objective assessment of academic and scientific workers at individual universities, which could be followed by a differentiated remuneration of such “quality” tuition executed by the specific workers. Kember [36] stated that many academics chiefly consider themselves specialists in their discipline, and it is difficult to convince them to try innovative forms of tuition. This should lead to a greater involvement of students in tuition, as confirmed by existing evidence about the higher efficacy of some new forms of tuition on learning [37].

In the field of scientific research (generally creative) activities, a detailed methodology for assessing “quality” has been created for pedagogic and scientific workers in the Czech Republic, which is constantly updated by the management of universities and also national authorities (including quantitative indicators). The monitored criteria change over time. For instance, the required minimum criteria for scientific research activities necessary for the successful completion of studies within the terms of doctoral study programmes or initiation of rehabilitation proceedings and proceedings for appointment as a professor increase constantly. The fact that these criteria differ substantially between the same fields and individual schools (faculties) is problematic. A frequent issue concerns the changes to the weights of reported and monitored criteria, which have a significant impact on the long-term predictability of funding the educational institution as a whole. Whether the growth of such a monitored “quality” in scientific research activities also has the effect of increasing the quality of an educational institution in terms of its pedagogic activities is addressed below.

4. Materials and Methods

As stated above, the objective of this paper is to measure the quality of the pedagogic process during the provision of services at publicly established universities in the Czech Republic during the academic year of 2011/2012, and to note any changes in this field in the academic year of 2018/2019.

A basic group of public universities consisting of 26 subjects, classified by [38] into four groups, as recorded in Table 2, is assessed.

Table 2. Classification of universities into groups.

Groups	Universities
Art universities (group 1)	AMU, AVU, JAMU, UMPRUM
Nonuniversities (group 2)	VŠTE, VŠPJ
Smaller universities (group 3)	VŠCHT, ČZU, JU, MEN, OU, SU, TUL, UHK, UJEP, UPa, UTB, VFU, VŠB-TUO, VŠE, ZČU
Larger universities (group 4)	MU, ČVUT, UK, UP, VUT

For this purpose, the quality of the provided services on the level of the assessed public universities is measured by means of:

- the number of students per pedagogic or scientific worker according to acquired qualifications (professor, docent, specialist assistant, assistant),
- the quality of the pedagogic apparatus, i.e., the pedagogic and scientific worker, according to acquired qualifications (professor, docent, specialist assistant, assistant).

For the calculation of both quality indicators specified above, it is necessary to quantify the “differences” between the qualifications acquired by pedagogic and scientific workers, i.e., the differences between a professor, docent, specialist assistant, and assistant. The Ministry of Education, Science, Research, and Sport of the Slovak Republic [39] quantifies these differences using a coefficient of the qualification structure as follows: professor—2, docent—1.66, specialist assistant—1.33, and assistant—1. Using this coefficient, the indicators in question for the individual public universities are calculated as follows:

$$Q1 = \frac{\text{students}}{Q2} \quad (1)$$

$$Q2 = \frac{\text{profesors} \times 2 + \text{docents} \times 1.66 + \text{specialist assistants} \times 1.33 + \text{assistants} \times 1}{\text{profesors} + \text{docents} + \text{specialist assistants} + \text{assistants}}. \quad (2)$$

Using the created quality indicators, the following research hypotheses are verified in the subsequent chapter using the created quality indicators:

Hypothesis 1. Assumption of statistically significant differences in the number of students ($Q1$) between individual PU groups.

Hypothesis 2. Assumption of statistically significant differences in the quality of the pedagogic apparatus ($Q2$) between individual PU groups.

Hypothesis 3. Assumption of a statistically significant negative linear relationship between the number of students ($Q1$) and the quality of the pedagogic apparatus ($Q2$) on the level of individual PU groups.

The definition of H1 and H2 is based on the classification of PU into four MEYS groups. Within the terms of H3, we assume that a smaller number of students taught by one pedagogue should lead to a higher quality of tuition, i.e., it translates into more opportunities for an individual approach by the pedagogue to the student.

The input data for assessment are taken from the annual reports of individual public universities within the terms of the monitored period, [40–42], and other documents available on the website of the Ministry of Education, Youth, and Sports of the Czech Republic.

The acquired results are supplemented by statistical verification using a Kruskal–Wallis test (Q), Levene test (LE), and Kendall rank correlation coefficient (r_K). A multicriteria assessment is executed using TOPSIS techniques (see [43,44] for the calculation procedure) under the condition of the equality of monitored quality indicators. The analyses are executed with MS Excel, Statistica 13.4, and the Statgraphics XVIII software.

5. Results

This section assesses the quality of universities in the Czech Republic in various aspects in the academic years 2011/2012 and 2019/2019. “Quality” is initially assessed on the basis of the number of students per standardised pedagogic worker. This is followed by the assessment of the “quality” of pedagogic workers by means of the qualifications they have acquired (professor, docent, specialist assistant with PhD, or specialist assistant without PhD). The authors integrated the monitored indicators of scientific research activities, and also the monitored indicators of the “quality” of tuition within the terms of accreditation activities, into the assessment of the quality of the pedagogic process by means of this indicator. The authors of this paper work on the assumption that university pedagogic workers have a high motivation to acquire higher qualifications and therefore move up the ranks of the university. The universities themselves have detailed internal regulations and guidelines for this matter, the objective of which is a lump sum reward on professional progress within the terms of qualification (successful acquisition of a scientific research grant, publication of articles in magazines with an impact factor, acquisition of a new accreditation or defence of an established accreditation, etc.). The pedagogic workers are also motivated to increase their qualifications by long-term financial compensation, as well as lump sum rewards. This is linked to their progress to higher qualifications and other benefits, which are linked to a rise in status (moral perception by the general public, etc.). This is followed by a section that shows the “quality” of the pedagogic process by combining both indicators, i.e., the number of students in combination with the number of pedagogues and their acquired qualifications.

5.1. Number of Students as a Quality Indicator (Q1)

The first assessed quality indicator is the number of students per standardised pedagogic worker. The differences at the beginning and end of the monitored period, i.e., in the academic year 2011/2012 and the academic year of 2018/2019, are illustrated in Figure 2.

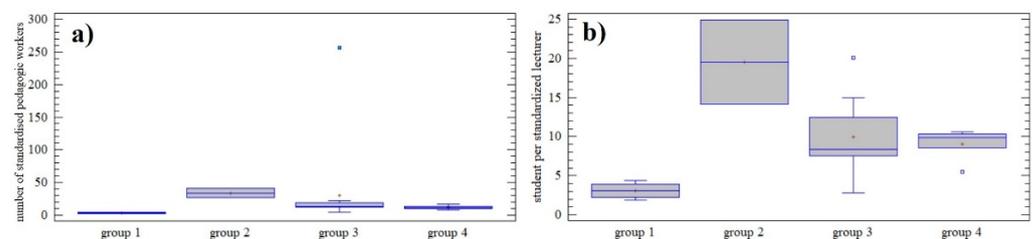


Figure 2. Number of students per standardised pedagogic worker according to MEYS groups in (a) academic year 2011/2012 and (b) academic year 2018/2019.

In the academic year 2011/2012, we observed different values of this indicator across groups of universities. During the illustration using a box plot (see Figure 1), which we needed to interpret in the context of the extent of variation influenced by extreme values, we noted a difference in the median ($Q = 13.5462$; $p \leq 0.01$). During this time, with the application of the Bonferroni post hoc method, we could identify the first group of universities, i.e., art universities, as a separate group. We can confirm H1 on the basis of these results.

Despite this difference, the homogeneity of their dispersal was confirmed ($LE = 0.8543$; $p = 0.4793$), and therefore the differences within individual groups are the same. Differences between individual groups of universities increased significantly at the end of the monitored period. Nonuniversity colleges (the second group) retained a dominant position; we recorded the fewest students in the academic year of 2018/2019 at art universities. The differences ($Q = 12.0182$; $p \leq 0.01$) and also uniform dispersal ($LE = 2.6754$; $p = 0.0722$) were maintained. Whether we can extrapolate this to the entire monitored period or whether it is relevant to just the two aforementioned academic years is reported in Figure 3.

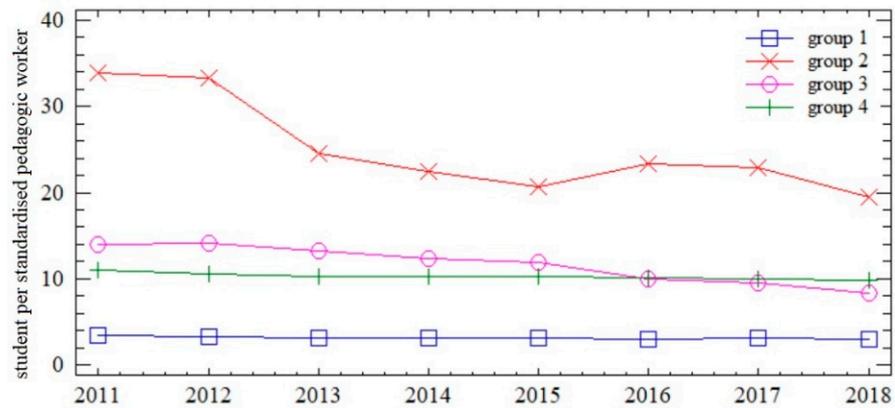


Figure 3. Evolution of the median number of students per standardised pedagogic worker according to the MEYS group from academic years 2011/2012 to 2018/2019.

When monitoring the change in the number of students per standardised pedagogic worker (Figure 3), we observed a stable development, or a slight reduction, in the case of art universities (the first group) and larger universities (the fourth group). In the case of these institutions, the shift in the number of pedagogic workers reflects the shift in the number of students and vice versa, whereas the year-on-year shift did not exceed 5% (negative in the majority of cases). In the other two groups, this year-on-year reduction was more marked, often exceeding 10% (six of 14). Nonuniversity colleges and smaller universities are unable to deal with a fall in the number of students, which is also reflected in the number of their pedagogic workers (see Figure 4).

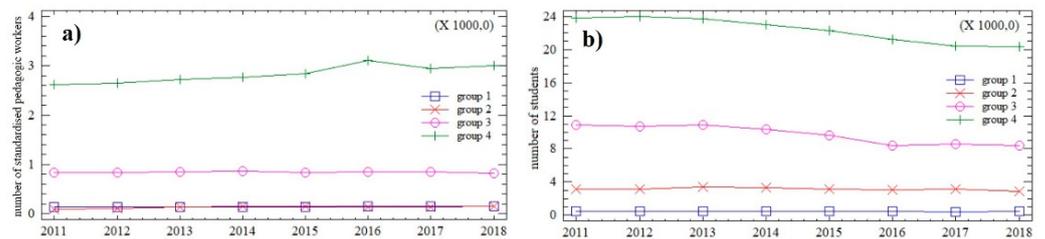


Figure 4. Evolution of the median number of standardised pedagogic worker (a) and students (b) according to the MEYS group from academic years 2011/2012 to 2018/2019.

5.2. Quality of the Pedagogic Apparatus as a Quality Indicator (Q2)

The second assessed indicator for evaluating the quality of the pedagogic process at universities is the quality of the pedagogic apparatus, taking into consideration qualifications in the form of academic titles. The state at the beginning and end of the monitored period, i.e., academic year 2011/2012 and academic year 2018/2019, is reported in Figure 5.

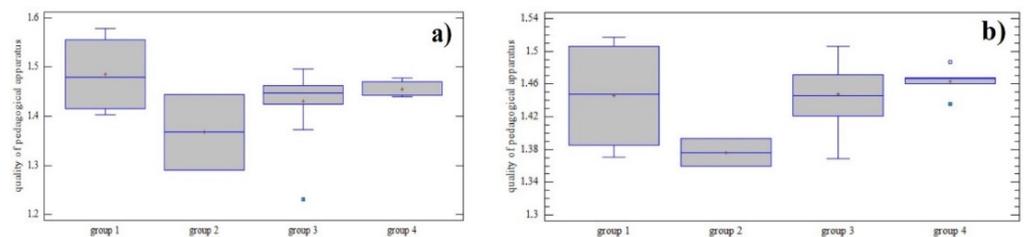


Figure 5. The quality of the pedagogic apparatus according to the MEYS group in academic years 2011/2012 (a) and 2018/2019 (b).

At the beginning of the monitored period, we can observe the quality of the pedagogic apparatus (Figure 5) through the variability within the terms of the group and also in the difference in quality between groups. The greatest differences are in the least numerous group of nonuniversity colleges ($v_{\text{group1}} = 7.96\%$); on the contrary, the smallest differences can be observed for larger universities, i.e., within the terms of the fourth group ($v_{\text{group4}} = 1.22\%$). However, the differences in the quality of the pedagogic apparatus cannot be called significantly different between individual groups ($Q = 1.7487$; $p = 0.6261$). On the basis of these results, we can disprove H2.

At the end of the monitored period, we repeatedly observe the uniformity of the group of larger universities ($v_{\text{group4}} = 1.25\%$) during a reduction of the differences in other groups. Differences within the terms of the variability of individual groups ($LE = 4.5110$; $p = 0.0130$), not between them ($Q = 4.8372$; $p = 0.1844$), were confirmed. Whether we can attribute this state to the entire monitoring period is reported in Figure 6.

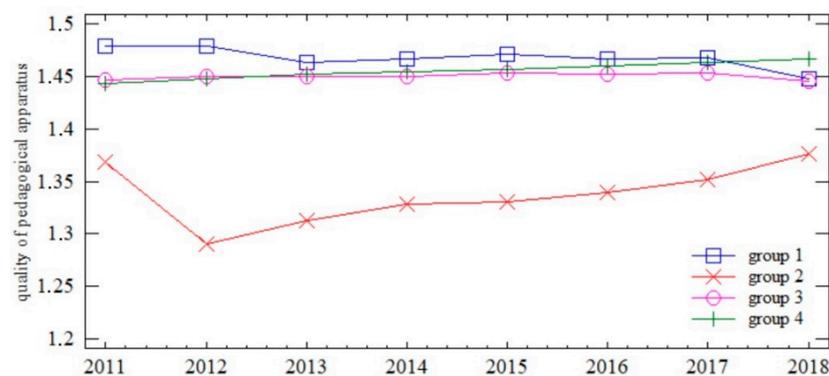


Figure 6. Development of the median quality of the pedagogic apparatus according to the MEYS group from academic years 2011/2012 to 2018/2019.

When monitoring the development of the quality of the pedagogic apparatus, we observed a different situation between groups of universities (Figure 6). Year-on-year changes, with the exception of one situation (academic year 2012/2013 in the second group), did not exceed 2% in the positive or negative sense. From this viewpoint, the differences between the three groups of universities are minimal. The quality of the pedagogic apparatus is lowest in the long term at nonuniversity colleges; however, these differences continued to decrease after academic year 2012/2013. This structure, expressed in terms of the number of individual pedagogic workers, is reported in Figure 7.

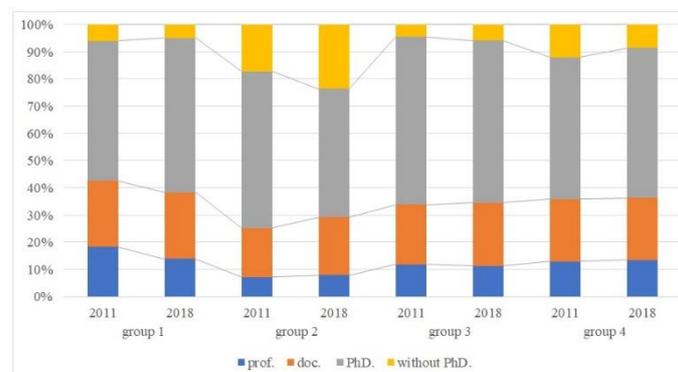


Figure 7. Structure of the pedagogic apparatus of the MEYS groups from academic years 2011/2012 to 2018/2019 (median).

5.3. Number of Students and the Quality of the Pedagogic Apparatus from the Viewpoint of Individual Universities

The last part of the analysis concerns both monitored indicators of the quality of the pedagogic process simultaneously. The results of monitoring the number of students per standardised pedagogue and also the quality of the pedagogic apparatus are as follows (see Figure 8).

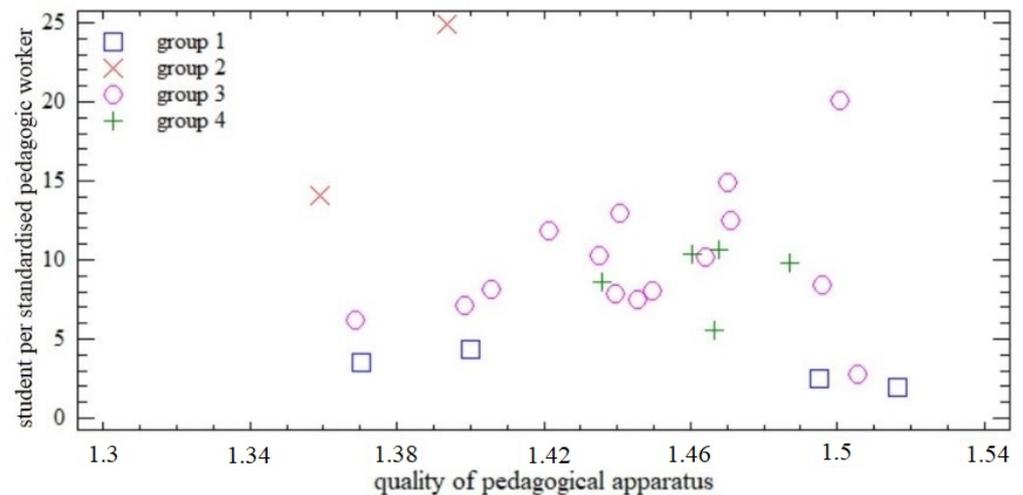


Figure 8. Quality of the pedagogic apparatus vs. number of students per standardised pedagogic worker according to the MEYS groups in academic year 2018/2019.

The results illustrate a considerable overlap regardless of the categorisation of the university. Art universities (the first group) can be characterised by a smaller number of students per standardised pedagogic worker. On the contrary, nonuniversity colleges (the second group) have a greater number of students. Within the third group of smaller universities, we observe differences more in the number of students than in the quality of the pedagogic apparatus. The results of larger schools (the fourth group) do not de facto differ from the results of the preceding group. If both quality indicators are taken into account simultaneously, without taking into account the PU group, the order is as follows (Table 3).

Table 3. Comparison of the quality of UP using TOPSIS techniques in the academic years 2011/2012 and 2018/2019.

Rank	2011/2012			2018/2019		
	MEYS	University	C_i	MEYS	University	C_i
1.	1	JAMU	1	1	JAMU	1
2.	1	AMU	0.992884	1	AMU	0.972143
3.	3	VŠCHT	0.985846	3	VŠCHT	0.960658
4.	1	AVU	0.977419	1	AVU	0.914956
5.	1	UMPRUM	0.973456	1	UMPRUM	0.888070
6.	4	ČVUT	0.971903	4	ČVUT	0.841761
7.	3	TUL	0.968333	3	VFU	0.809662
8.	4	UK	0.962300	3	TUL	0.770473
9.	4	UP	0.962186	3	OU	0.754386
10.	3	JU	0.961192	3	ZČU	0.737655
11.	3	OU	0.955287	3	JU	0.732830
12.	3	ZČU	0.954367	3	UPa	0.725362
13.	4	VUT	0.953012	3	VŠB-TUO	0.717977
14.	3	VŠB-TUO	0.951619	4	UP	0.708175

Table 3. *Cont.*

Rank	2011/2012			2018/2019		
	MEYS	University	C_i	MEYS	University	C_i
15.	3	MEN	0.950940	4	UK	0.655043
16.	3	UPa	0.949021	3	UJEP	0.641483
17.	3	UJEP	0.945110	3	MEN	0.637044
18.	4	MU	0.940218	4	MU	0.632998
19.	3	UHK	0.937717	4	VUT	0.621358
20.	3	SU	0.932894	3	SU	0.567808
21.	3	VŠE	0.931311	3	UHK	0.539711
22.	3	UTB	0.924072	3	UTB	0.517417
23.	3	ČZU	0.917987	2	VŠPJ	0.467984
24.	2	VŠPJ	0.902251	3	VŠE	0.434042
25.	2	VŠTE	0.842624	3	ČZU	0.213620
26.	3	VFU	0	2	VŠTE	0.011005

C_i —relative distance to PIS alternative (result of TOPSIS technique).

The Janáček Academy of Music and Performing Arts in Brno (JAMU) can be identified as the best-rated UP in the first and last assessed years, followed by the Academy of Performing Arts in Prague (AMU) and the University of Chemistry and Technology (VŠCHT). The highest quality of the pedagogic process is therefore observed in the first group of art UP. On the contrary, from the viewpoint of the second assessed indicator, the quality of the pedagogic process is the lowest at nonuniversity public colleges. The greatest shift in the order of placement can be attributed to the University of Veterinary and Pharmaceutical Sciences Brno (VFU).

Looking back, we can observe an increase in differences between individual UP, which is accompanied by a reduction in the skew of the acquired results ($\beta_{2011} = -4.878$; $\beta_{2018} = -1.113$). If we viewed the relationship between these quality indicators at the level of individual groups of UP, the results would be as follows (Table 4).

Table 4. Results of order linear correlation of quality indicators (Q1, Q2).

	Group 1	Group 2	Group 3	Group 4
r_K	-0.43 *	0.19	-0.01	0.17

* Significant at the level of importance $\alpha = 0.05$.

The quality of the pedagogic apparatus increases the smaller the number of students, i.e., with more time to devote to each student. There is also the opportunity for personal development, publication, or project activities. In other UP groups, these two indicators of quality do not correlate in a linear way. The assumption for H3 was therefore confirmed only in the case of art UP (the first group), i.e., we can disprove H3.

6. Discussion and Conclusions

Šebková et al. [45] stated that the “quality” of university education has been mentioned for several decades in a number of countries as a key priority and should lead to further development of university systems. Chvátalová et al. [46] stated that the quality of university education in the Czech Republic is monitored by a number of international organisations, which is also evidenced by the frequently published rankings of universities. These usually differ from each other by the number of assessed criteria, which subsequently corresponds to the different results in placement of the assessed institutions (e.g., QS, ARWU, or THE assessment). Other organisations monitoring “quality” include, for example, the International Network for Quality Assurance Agencies in Higher Education (INQAAHE), established in 1991, or the European Network for Quality Assurance in Higher Education (ENQUA) [47].

In his work, Neave [48] introduced the useful term conditional autonomy, which we understand to mean the conditions that enable a university to achieve the expected output level of graduates or enable a comparison of the number of workers compared to other parameters and to the nationwide standard. However, what is the nationwide standard? Is it developing? Is it good that it is developing? In their work, Šebková et al. [49] stated that there are a number of different views of the concept of “quality”. According to them, quality can be defined as:

- perfection, excellence, the effort to be the best;
- compliance of a product with the defined standard;
- suitability for a specific purpose, eligibility for a defined purpose;
- threshold, i.e., fulfilment of at least the minimum defined standards;
- improvement of the monitored parameters, or growth of the institution.

How to appropriately define the quality of work of universities is quite a complex matter and depends on the point of view of the specific author. Stes et al. [50] stated that evidence of the impact of professional development of pedagogues on the quality of tuition of students is rare in university education. In his work, he stated that the quality of tuition by a pedagogue is not dependant on the size of the class or the number of students. Martensson et al. [12] stated that growing pressure on increasing “quality” by means of increasing the qualifications of pedagogues creates an unhappy gap between the formal rules of university institutions and routines and everyday procedures in the academic sphere, which are linked to teaching and learning.

The authors of this paper incline towards the long-term horizon of measuring the quality of university education according to De Weert [51], who was inspired by other sectors and defined three aspects of monitoring quality: quality of inputs (finance, qualification structure of the teaching body, spatial and technical equipment of the school, administrative processes, the quality of the admitted students); quality of processes (procedures by the management to achieve the set goals); and quality of outputs (compliance of individual goals with long-term and strategic goals), which will be assessed in other works. The objective of this paper was to point out one of the possible methods for assessing “quality” under the conditions of public universities in the Czech Republic. On the level of individual UP groups, differences in the number of students were confirmed (H1), but not in the different quality of the pedagogic apparatus (H2). However, there are differences between individual universities, as evidenced by Table 2 and the chart of universities for academic years 2011/2012 and 2018/2019. The table shows a shift in the placement of some universities over time that does not correspond to the order of universities in terms of international comparison according to the QS, ARWU, or THE assessment.

According to the authors, it is essential to ensure a greater involvement of students in tuition, innovate forms of tuition, and actively support all forms of discussion and interconnection of theory and practice, in order to improve the assessment of tuition from the viewpoint of students’ perceptions. It is also important to support and systematically create an environment of mutual trust between all elements of the assessed institution (students, pedagogues, and management) and to realise various types of assessment (not just accreditation or science, but also tuition) and to evaluate this in an adequate manner. From our point of view, smaller study groups can be considered a “suitable climate for tuition and discussion”. With the exception of the group of nonart UP, we must, however, state that smaller groups of students do not lead to a higher quality of tuition (H3). Discussion in tuition is also promoted more by a greater number of docents and professors, from whom we can expect more experience in how to connect theory with practice. These individuals should represent versatile personalities in the field of their speciality. The higher professional qualification of a university pedagogue is linked to scientific research activities and creative activities in the form of publishing in important magazines with an impact factor and the submission, management, and resolution of research tasks and projects. The management of the university or the faculty is responsible for assuring these prerequisites. They should endeavour to support the growth of the qualification structure

of their employees, on the one hand, and a regular active communication (discussion) with students, not only of the methods and form of tuition, but also of their comments and suggestions for improvement of the “quality” of tuition, on the other hand. In the long term, not just research activities, which are better expressed quantitatively and qualitatively than the assessment of the quality of pedagogic activities, should be assessed and evaluated regularly at public universities in the Czech Republic. The quality of tuition is discussed, but its objective evaluation is not very successful. Teaching activities at a number of public universities in the Czech Republic are left in the “shadow” of research activities, and there are tendencies by individual universities to categorise themselves as just teaching universities or research universities, depending on the reported publication activities. This is also partially confirmed by the classification of public universities by MEYS into four categories, according to which public universities were assessed above within the terms of this paper.

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