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Pedagogic Training of Engineering Masters for Cultural Conformity

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Abstract

In the modern conditions of arising postindustrial society, industrial processes in the technical domain based on the centralization principle are now replaced with autonomy and responsibility. In this regard, it is topical to make an accent of professional responsibility in the result and target domain of engineering masters applying the cultural conformity principle.

This article aims to introduce the issue of building moral and ethical competences in college students and to build a comprehensive approach to professional responsibility into the current discourse of higher education. Hence, considering the cultural conformity principle, this article is designed to define the educational conditions for learning pedagogical discipline by engineering masters in order to form personnel value focuses in further production activities.

Researchers of the Orel State University Named after I. S. Turgenev studied the actual correspondence level of the competences of engineering graduates in Operation of Transport and Process Machines and Complexes declared by the educational establishment to the current demands. The leading research method was survey. It covered 69 respondents – experts and managers of car service enterprises in Orel region. The research allowed defining the demand in the main stakeholders for Master's degree graduates to impact building professional responsibility in the production personnel as future line managers.

The article substantiates the presentation of cultural conformity principle in value focuses of profile production activities in the educational process. Metaethics provisions are based on a set of pedagogical and social philosophy ideas which are primary in practical pedagogical activities.

The approach offered by the authors facilitates readiness of a Master's degree graduates majoring in engineering for pedagogical activities within the profile production site corresponding to current demands.

Keywords: postindustrial society, professional responsibility, pedagogic training of Master's degree graduates; cultural conformity principle, metaethics provision, educational goals corresponding to current demands.

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Introduction

Current postindustrial society to a great extent dictates the rules for operation of production technical domain. Individualization is recognized to be the main feature of human capital in the postindustrial society (Bucciarelli, 2008; Dempsey, 2015; Illes & Vogell, 2018).

In postindustrial age, everyone expects an inevitable shift to free and responsible activities of individuals (Bell, 2004). Professional responsibility of contractors is also substantially emphasized. Individualization concept inherent to postindustrial society is a basis for making certain changes in the result and aim domain of engineering training. The emphasis is put on readiness of Master's degree graduates as future line managers to supervise building professional responsibility in the production personnel (Persikova, 2011; Perfilieva, 2011; Price & Whiteley, 2014). This type of managerial activities in the production sphere includes a pedagogical influence on personnel. It reveals a pedagogical issue not emphasized earlier – creating educational conditions for engineering masters to learn pedagogical activities aimed at forming value focus of the production personnel. It is common knowledge that employees with underdeveloped sense of social responsibility are a real threat to the efficiency of production activities and competitiveness of an enterprise (Beckmann, 2000; Lenk, 1998).

The considered issue is also topical considering the shortage of educational models aimed at forming the skills of pedagogical influence in engineering masters during college education. Accordingly, it is important to develop a complex of pedagogical and social philosophy ideas which are primary in the mentioned pedagogical training of engineering masters.

Purpose and objectives of the study

The research is aimed at defining the educational conditions for learning pedagogical discipline by engineering masters to form personnel value focus in further production activities applying the cultural conformity principle. The reason for applying the pedagogical means in managing the work of personnel and the insufficiency of simply declaring of cultural values to the employees is based on the provision offered by a renowned educator and cultural scholar Diesterweg (1998, p. 97) who claimed that, “the mankind will never be fully complete as the cultural conformity principle can approach the natural conformity principle but it can never match it totally”.

This article aims to introduce the problem of forming moral and ethical competences in engineering masters and to build a comprehensive approach to professional responsibility into the current discourse of higher education issues.

Literature review

Engineering education is closely related to modern trends of developing the forms and methods of management and organization activities in the production process. Applying cultural conformity principle in the process of forming the moral and ethical domain of engineering education is deemed historically reasonable and socially necessary (Bucciarelli, 2008; Gasheva, 2014). The concept of education applying the cultural conformity principle is based on the idea of unique personal development processes: self-actualization, self-organization (self-made-man), and ability to consciously choose a position in cultural ambiguity. Production activities of an expert, a specialist in cultural conformity are important for the

society (Vasenkin, 2011). Specialists act as culture members who are able to participate in acquisition, use and reproduction of culture.

Applying the cultural conformity principle to organization of the educational process of engineering majors allows combining the provisions of humanitarian and engineering sciences; creating the educational conditions for “interlinking” the professional values of the past and the present in the minds of the students; aligning the common human culture and the culture of the professional society; and assessing one's own inner world.

Implementation of the cultural conformity principle in the educational process of engineering masters is defined by the peculiarities of the moral and ethical domain of engineering production activities: a wide range of responsibility types incurred by the production personnel; ethical issues related to moral and non-moral duty; and distribution of professional responsibility among workers (Bukalova, 2014).

Methodology

The issues of readiness of engineering Master's degree graduates for a pedagogical impact in managing the work of the production personnel is revealed on the first stage of the study: defining the topical importance of educational aims declared by the college. The research took place on the Chair of Machine Service and Repair of the Orel State University Named after I. S. Turgenev (Bukalova & Novikov, 2018). The competence-based approach was applied as the main methodology. The research was conducted using the formalized expert poll method in the form of a survey. The target of the research was topical significance of educational aims within the college graduates competences. Respondents were provided with 45 competences of graduates from the chair of Operation of Transport and Process Machines and Complexes.

The experimental facility of the research was comprised of 12 most competitive car service enterprises of the region. Research sample rate was based on the number of car service enterprises which are official dealers of car companies operating in Orel region. Respondents were sampled from managers and experts of car service enterprises.

The second stage of the research implied the creation of a pedagogical training concept of car transport Master's degree students.

Pedagogical activities of engineering masters within the production focus on forming a professional responsibility of contractors. Cultural conformity principle is applied as a methodological ground for pedagogical training organization for Master's degree students. In this particular case, cultural conformity as a pedagogical category is defined as focusing the educational process on learning professional culture as a component of common human culture by engineering masters. In this regard, someone needs to present the value and sense focuses of professional activities in the educational process of professional production activities as a cultural and historical value considering that in “cultural conformity concept, personal qualities of a human being are actualized within social life”. When Master's degree students acquire methods of training production personnel in corporate culture foundations, they should generate new social experience and at the same time transform it into a cultural form.

Forming of moral and ethical nature of education of engineering masters is based on the provisions of metaethics, a discipline of analytical and philosophical methodology. Metaethics studies methodological ethical issues, a part of logical positivism.

Results

Results of the first research stage revealed that the most important competences of college graduates out of the considered range (45 competences) in terms of production activities in car service enterprises were reported to be moral and ethical competences. Weighted average points (a 100-point assessment scale) of respondents in this competence block are provided in Table 1.

Table 1. Level of correspondence of a fragment of studied competences of engineering graduates to the current demands.

Competences of university graduates	Assessment by production experts (points)	Assessment by students (points)
Ability to work in a team with tolerance to social and cultural differences.	96.82	57.87
Readiness to apply moral and ethical standards.	96.92	66.45
Knowledge of all types of professional responsibility in the aspect of moral and ethical regulations.	93.85	55.64

As the experts of the regional profile production area acknowledged the importance of acquiring moral and ethical competences by the Master's degree students and as a material discrepancy was revealed between their assessment and the assessment of the students, a pedagogical problem was revealed, which has not been emphasized before: acquiring moral and ethical competences. The revealed problem emphasizes a theoretical approach to the moral and ethical competences as a crucial mechanism for work regulation in engineering sphere. To form a theoretical basis of moral and ethical educational aims, we considered an objective and a subjective part of professional responsibility. Analyzing professional responsibility in the context of professional ethics allowed differentiating the educational regulations in accordance with the known metaethics concepts (Maksimov, 1998) into the prescriptive and descriptive competences. It was a basis for defining pedagogical technologies of competences forming.

Based on personal engineering work experience, the authors provided a range of professional responsibility types of engineering employees in light of ethical problems (Bukalova, 2014).

Discussions

The revealed correspondence of readiness of Master's degree students to make a pedagogical impact on the production personnel to the current demands implies their acquiring of moral and ethical competences. It emphasizes a theoretical approach to professional responsibility as an important regulation tool for production personnel work behavior.

Professional responsibility as a general scientific category is the ability of employees to perform their work duties while realizing their consequences (Agaczci, 1998; Lenk, 1996; Beckmann, 2000; Lester, 2014). This includes the objective and the subjective responsibility (Price & Whiteley, 2014):

- direct relation between the activity result and its consequences reflects the objective part of professional responsibility;
- employee's understanding of his or her role in the consequences of the activity represents the subjective part of professional responsibility.

The subjective part of professional responsibility may be manifested at a personal level as:

- readiness to take a risk (an admissible risk level is implied); and
- realizing inevitable "hazard pay" in case of exceeding the admissible risk level.

It is common in engineering production sphere management that the level of professional responsibility of an employee depends on the level of self-sufficiency and the scale of the made technical, technological and management decisions; importance of possible adverse effects of the latter; and level of respectfulness and professional state of the employee (Bagdasaryan, 2014; Kosyakov et al., 2014). In addition, administrative authorities of employees formally determine their professional responsibility (Lenk, 1998).

Master's degree students as future line managers shall be instructed that in actual production process, the social importance of professional responsibility and employee's own perception of it might not coincide. However, deliberate efforts aimed at employees' realization of possible adverse effects lead to correspondence to the requirements of professional responsibility in production activities.

In scientific sphere, the professional responsibility phenomenon is discussed as part of the professional ethics dimension (Hessen, 1995; Jonas, 2004; Gasheva, 2014; Kosyakov et al., 2014; Safin & Korchagin, 2017; Chuchalin, 2011). Considering the issue of pedagogical training of Master's degree students within metaethics provisions allows structuring the range of moral and ethical competences. In metaethics, moral elements are divided into prescriptive (of unconditional value) and descriptive (provable with certain arguments) (Maksimov, 1998). Each moral and ethical competence as an educational aim is essentially a regulatory ethical conclusion (in metaethics terms). Hence, one needs to distinguish between prescriptive and descriptive competences in the range of moral and ethical group of competences.

It is necessary to distinguish the competences of the mentioned groups to provide for the optimal selection of pedagogical formation technologies. Thus, the application of the provided conceptual and theoretical metaethics provision regarding prescriptive competences provides a rather unexpected conclusion: pedagogical task of acquiring this type of competences implies only their *introduction* to the students as a positive ethical focus of work behavior. It is substantiated by a thesis offered by a renowned ethics researcher Maksimov (1998, p. 51) who proved that prescriptive moral values “...shall be considered only as “facts” or reality of human life allowing only for a causal explanation and not for logical reasoning”. In terms of metaethics, this is a sufficient condition for a student to become a carrier of general ethical values. A distinguished feature of moral and ethical competences considered in view of non-cognitivist approach is reflecting the general moral principles as if answering the question on the employee's duty which is unconditional and binding. Competences declaring prescriptive moral values represent a desirable moral position of an employee as a person.

It is reasonable to present ethical competences reflecting specific requirements of engineering production sphere using a cognitivist approach implemented within descriptive ethics concept. Hence, ethical competences of this kind may be formed by students with the use of description and clarification training technology as well as context learning technology. In accordance with the conceptual provisions of descriptive ethics, acquisition of these competences demands clarification of value positions of the employee in production and their actual substantiation.

Production personnel in engineering covers a wide range of responsibility types due to technical regulations, job descriptions, contractual relations with the clients, etc. (Kosyakov et al., 2014). It should be noted that these elements of professional responsibility cannot be classified as moral responsibility directly. In scientific sphere of professional ethics, these types of responsibility relate to “*ethically neutral or non-moral*”, in terms offered by Lenk (1996). Within the engineering production process, non-moral obligation and necessity are structurally covered by professional responsibility of production personnel. Considering this diversity in professional responsibility structure of an employee, there may arise a conflict between the moral and non-moral (ethically neutral) responsibility. Modern production activities in technical domain are entrepreneurial and value-oriented. At that, the main production activity aims are: profitability, effectiveness, feasibility, and capability (Beckmann, 2000; Dempsey, 2015). Achieving these values in the production process is a part of professional responsibility of any employee. While well-being of consumers of products and services provided by production activities is an indisputable and generally accepted value establishing the moral duty of the worker.

However, actual engineering production activities may face a conflict between the moral and non-moral duty. Thus, to form a professional responsibility, one needs to create the educational conditions facilitating perception of unconditional highest priority of moral responsibility even if it leads to decreased economic indicators of production activities.

When forming professional responsibility, one needs to consider the ethical issue of professional responsibility distribution among workers as a feature inherent to engineering production process. Modern engineering work processes are implemented by groups of employees. Thus, it is often difficult to distinguish a personal activity of a separate employee in the aggregate work group results in technical activity (Jonas, 2014). It may lead to loss of personal responsibility by an employee. This engineering production process feature will lead to occurrence of two ethical issues related to professional responsibility. The first issue is distribution of professional responsibility within a group of employees. The second issue is implementation of professional responsibility of employees of cooperating enterprises based on interrelated production processes. A peculiarity of these issues is absence of direct work interrelation of employees.

Such ethical problems in practical production activities necessitate for the students to acquire the competences reflecting their readiness to professional activities provided by the external corporate responsibility of an enterprise as a whole. In this regard, in the educational process, we need to emphasize a social aspect of production activities uniting professional responsibility of a separate employee and collective, corporate responsibility.

Moral responsibility of personnel should be vested not to the personnel as a whole but to the employees who form the company. This assumption is based on a professional ethics provision implying that professional responsibility is a component of employee's personality (Jonas, 2004). It is important for students to understand that the level of professional responsibility cannot be decreased due to the growth of the responsible work group. Thus, students can acquire the understanding of inevitable personal component of collective professional responsibility different from individual responsibility of an employee.

Professional responsibility of an engineering employee is related not only to anthropocentric ethical issues. Professional responsibility in engineering production also includes the environmental issues. Technical enterprises may cause significant adverse effects for the environment. Such effects may cover a wide ecological system of an entire region.

The issue of adverse effect of production on the environment may be classified as an ethical issue as it is not always subject to control. Often only the professional responsibility of employees can guarantee environmental well-being of a region. It reveals a pedagogical problem of preparing students for the requirements of professional responsibility related to production activities and environmental safety.

Conclusion

Engineering masters' pedagogical training problem is reliably proven by the presented research results. Engineering Master's degree graduates shall be ready to impact the work behavior of the production personnel. Scientific and pedagogical training is a part of most Master's degree curriculums. However, it focuses on participation in the educational process in the college. In this regard, training of engineering masters should consider the demands of the profile production domain.

Cultural conformity principle emphasizes the social importance of future production activities of a Master's degree graduate as a human resource manager. Considering the training of engineering masters with a reference to cultural

conformity defines specific development areas of professional ethics pedagogical theory within the postindustrial society paradigm.

Considering the moral and ethical competences as educational aims of engineering masters from the point of view of logical positivism and applying metaethics provisions provided for a scientifically substantiated choice of pedagogical technologies and their acquiring by the students.

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