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THE METHODOLOGY OF CREATIVE TEACHING OF THE DISCIPLINE "TECHNOLOGY OF NATIONAL AND ORIENTAL SWEETS"

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Abstract. This article substantiates a methodology of creative teaching for the discipline "Technology of National and Oriental Sweets" within the system of vocational and professional education. The study proceeds from a paradox specific to technological disciplines: the subject is governed by sanitary norms, fixed temperature regimes and physico-chemical constraints whose violation renders the product defective or unsafe, so that creativity appears to stand in contradiction with technological discipline.

Keywords: vocational education, technology of sweets, national and oriental confectionery, creative teaching methodology, technological design space, bounded creativity, transformational creativity, tacit craft knowledge, organoleptic assessment, intangible cultural heritage, practical training, product development.

INTRODUCTION

The transformation of vocational and professional education over recent decades has substantially altered the requirements placed upon the specialist in food technology. Where the confectioner was once expected principally to reproduce established products in accordance with approved technological documentation, the contemporary food industry and the rapidly expanding hospitality and tourism sectors require a specialist capable of developing new products, of adapting formulations to changing consumer demand, of responding to nutritional and dietary trends and of presenting traditional products to consumers who encounter them for the first time. Each of these tasks presupposes creative capacity grounded in technological competence, and the preparation of such specialists accordingly becomes a methodological problem of the first importance for vocational education. The discipline "Technology of National and Oriental Sweets" occupies a distinctive position among the subjects of this preparation, since it possesses a dual nature. As a technological discipline it deals with the physico-chemical processes underlying the production of confectionery: the crystallisation and inversion of sugar, the stages of syrup boiling, caramelisation and the browning reactions that determine colour and aroma, the behaviour of fats and proteins, the binding of nut and seed masses, moisture migration and the factors governing shelf life. As a discipline of cultural transmission it deals with products that are elements of intangible heritage: navvot, parvarda, halva, pashmak and nisholda in the national tradition, baklava, lokum and sherbet in the wider oriental tradition, each bound to particular occasions of hospitality, to calendar and family rituals and to regional identities. The graduate of this discipline is simultaneously a technologist and a bearer of a culinary heritage. The prevailing pattern of teaching nevertheless remains predominantly reproductive. The student memorises formulations and technological maps, learns the normative quantities and the prescribed sequence of operations, and reproduces the product under the supervision of the instructor;

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assessment establishes how accurately the prescribed procedure has been followed. Several circumstances sustain this pattern and should not be dismissed as mere conservatism: sanitary requirements are strict and non-negotiable, technological documentation exists precisely in order to guarantee reproducibility, examinations are oriented towards normative knowledge, and the cost of raw materials limits experimentation within the educational workshop. Reproductive teaching is thus a rational response to the constraints of the subject rather than an arbitrary habit. Yet this response has become insufficient. The market demands new products and presentations; gastronomic tourism requires that national sweets be offered to visitors in forms at once authentic and intelligible; nutritional trends require the reformulation of traditional products; and export requires innovation in shelf life and packaging. A graduate able only to reproduce an approved formulation is prepared for a labour market that is contracting rather than for the one that is expanding. The methodological question is therefore how creative capacity may be formed within a discipline whose subject matter is governed by norms. This question conceals a paradox that constitutes the central theoretical problem of the present study. In most school subjects deviation from the expected answer is at worst unproductive; in a technological discipline it may render the product defective, economically worthless or unsafe for consumption. A syrup boiled beyond its intended stage cannot be returned to it; a violation of sanitary regime cannot be corrected by inventiveness. Creativity in such a discipline therefore appears to stand in direct contradiction to technological rigour, and the attempt to encourage it without qualification produces either unusable products or an instruction that quietly abandons the creative aim while retaining its vocabulary. The resolution proposed here proceeds from the concept of the technological design space. The constraints of the discipline do not eliminate the possibility of creative action; they define the space within which such action is meaningful. Within the boundaries set by safety requirements and by the physico-chemical properties of materials there remains an extensive field of variation in formulation, in the combination of flavours, in shaping, decoration, portioning and presentation. Beyond this field lies a further possibility, namely the deliberate alteration of a constraint that had been treated as fixed, as when the sugar content of a traditional product is reduced or an alternative binding agent is introduced. M. Boden's distinction between combinational, exploratory and transformational creativity describes this structure precisely, and carries an important pedagogical consequence: transformation of a space requires deeper knowledge of that space than exploration within it, so that creativity and technological rigour stand in a positive rather than an inverse relation.

LITERATURE REVIEW

Within Uzbek pedagogical scholarship the theoretical foundation of the present study is supplied above all by the work of Q.T. Olimov on the methodology of teaching special subjects. The scholar's principal contribution consists in the systematic description of the structure of instruction in technological disciplines, in which theoretical study and practical training form a single process rather than two parallel ones, and in the demonstration that the effectiveness of such instruction depends upon the correspondence between the logic of the production process and the logic of its pedagogical presentation. Of particular significance is his treatment of the technological map not merely as a prescription to be executed but as an object of analysis, since this converts normative documentation from an obstacle to creative work into its point of departure: the student who understands why a map

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prescribes what it prescribes can judge where variation is admissible. The second pillar of the theoretical framework is provided by the research of N.A. Muslimov on the professional formation of the teacher of vocational education. The scholar substantiates the thesis that such a teacher possesses an integrative competence combining the qualifications of a specialist in the branch with those of a pedagogue, and that the weakness of either component undermines the whole. This position bears directly upon the methodology proposed below, since creative teaching in a technological discipline is possible only where the teacher commands the subject deeply enough to distinguish admissible variation from technological error. The domain foundation of the discipline is supplied by the work of K. Mahmudov, whose systematisation of national culinary heritage records not only formulations but also the ritual and social functions of dishes, and thereby furnishes the ethnographic material without which the cultural component of the discipline cannot be taught. The value and institutional dimensions of the problem are illuminated by contemporary research on education and the formation of worldview. In the work of S. Ergashbaev on the development of the spiritual worldview of young people through the system of continuous education, it is substantiated that value orientations are formed through sustained pedagogical processes, a thesis of direct relevance to a discipline in which the student is expected to become a conscious bearer of national culinary heritage rather than merely a producer of goods. In a further study by the same author concerning the elevation of the spiritual and philosophical worldview of young people, the capacity for independent critical reflection is singled out as a central educational outcome, which corresponds to the requirement that the student justify the technological decisions he takes. The study by M.M. Mirzaolimjon og‘li and E. Shohbozbek on the educational policy of New Uzbekistan and new models of universities discloses the institutional context of the reform of professional education. Within foreign scholarship the problem has been framed through several distinct traditions. M. Boden analysed creativity as the production of ideas that are novel, surprising and valuable, and distinguished combinational, exploratory and transformational forms of it according to their relation to the constraints of a conceptual space. M. Csikszentmihalyi advanced a systems model according to which creativity is not a property of the individual mind but arises from the interaction of person, domain and field, so that novelty becomes creativity only when the competent field recognises its value. R. Sennett examined craftsmanship as the disposition to do work well for its own sake and showed that repetition and material resistance are conditions rather than obstacles of skilled innovation, while J. Lave and E. Wenger described learning as participation in a community of practice through which the novice moves from the periphery towards full membership.

RESEARCH METHODOLOGY

The methodological foundation of the present study is constituted by the systemic approach, which made it possible to treat the teaching of a technological discipline as an integral system uniting theoretical instruction, practical training in the workshop and the assessment of products, so that a change introduced into any one of these components alters the others; within this general framework the activity approach performed the leading function, since professional competence in confectionery is formed only through the student’s own operations upon materials, and the design of instruction therefore had to proceed from the structure of the production process itself. The competence approach was applied in formulating the projected results in terms of what the graduate is able to produce, vary

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and justify, rather than in terms of formulations retained in memory. The theoretical analysis of pedagogical, technological and culturological literature served to reconstruct the conceptions of creativity, craft learning and technological instruction and to delimit them from adjacent notions. Technological analysis was applied to the production processes of the principal groups of national and oriental sweets in order to establish which parameters are invariant, being determined by safety requirements or by the physico-chemical properties of the materials, and which admit of variation without loss of quality; this analysis furnished the empirical basis of the three-zone model. The analysis of technological documentation, including formulations, technological maps and quality requirements, was employed in identifying the critical control points at which deviation is inadmissible. Content analysis was applied to curricula, syllabi and textbooks of the discipline in order to determine the proportion of reproductive and productive tasks within their apparatus. Pedagogical observation of practical lessons in educational workshops was used to establish the prevailing forms of work, the distribution of time between demonstration and independent execution, and the points at which students encounter difficulty in the perception of sensory indicators. Questioning of teachers and students served to establish their conceptions of creativity in the discipline and the obstacles they perceive to its development, while interviews with practising confectioners and enterprise specialists were used to determine the requirements of the professional field. The method of organoleptic expert assessment, in which the products created by students were evaluated independently by several qualified specialists according to defined criteria, was applied in assessing both the technological quality and the originality of those products. Pedagogical modelling yielded the three-zone model of the design space and the six-stage cycle of the creative practical lesson, and the method of pedagogical design was used to elaborate concrete task algorithms corresponding to each zone. The case method was employed in constructing professional situations requiring the reformulation of a product under defined constraints. Elements of the pedagogical experiment, organised in ascertaining, formative and control stages with comparable groups, served to verify the proposed methodology, and methods of mathematical statistics were applied in order to establish the significance of the differences obtained. General scientific procedures including analysis and synthesis, induction and deduction, abstraction, generalisation and modelling were applied at every stage and secured the logical grounding, the correspondence to evidence and the internal coherence of the conclusions.

RESULTS

The study established that the apparent contradiction between creativity and technological standardisation is resolved once the constraints of the discipline are understood as constituting a design space rather than as prohibiting design, and on this basis a three-zone model of that space was substantiated. The zone of invariants comprises the parameters that may not be altered under any circumstances: sanitary and hygienic requirements, the critical temperature regimes upon which the structure of the product depends, the physico-chemical thresholds governing crystallisation, caramelisation and the binding of masses, and, in the case of traditional products, those characteristics whose loss would deprive the product of its identity. The zone of controlled variation comprises the parameters that may be altered within technologically established limits: the composition of fillings, the selection of nuts, seeds, spices and aromatic components, proportions within admissible ranges, the form and size of the product, methods of shaping and decoration, portioning and packaging. The zone

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of justified transformation comprises the deliberate alteration of a parameter previously treated as fixed, such as the reduction or substitution of sugar, the introduction of an alternative binding agent, the modification of moisture content for extended shelf life or the development of a variant excluding a particular allergen; action in this zone is admissible only where it is grounded in technological reasoning and verified by testing of the resulting product. These zones correspond to the combinational, exploratory and transformational forms of creativity respectively, and yield three levels of the student's creative competence: the reproductive level, at which the student executes a technological map accurately; the combinational-variative level, at which the student composes new products within the zone of controlled variation and justifies the choices made; and the transformational-designing level, at which the student alters a constraint, explains the technological grounds of the alteration and validates the result. A second result consists in the six-stage cycle of the creative practical lesson: technological grounding, in which the student learns why the process proceeds as it does rather than only how it is performed; demonstration with guided perception, in which attention is directed to the sensory indicators by which the state of the mass is judged; exact reproduction, through which the invariant is mastered; the variation task, formulated with explicit limits and an explicit requirement of justification; product testing, in which the result is assessed organoleptically and technologically against defined criteria; and reflection, in which the student accounts for the decisions taken and for any defects observed. The analysis established that the sequence of these stages is not interchangeable, and in particular that variation tasks introduced before the invariant has been mastered produce defective products and an imitation of creativity rather than its development.

DISCUSSION

The results obtained require to be situated within the principal theoretical controversy concerning the nature of creativity, namely the opposition between the cognitive account advanced by M. Boden and the systems account developed by M. Csikszentmihalyi. In The Creative Mind, M. Boden defines a creative idea as one that is novel, surprising and valuable, and distinguishes three ways in which such ideas arise. Combinational creativity produces unfamiliar associations of familiar elements; exploratory creativity discovers possibilities that were implicit but unrealised within a structured conceptual space; transformational creativity alters one of the constraints that define the space itself, thereby making possible ideas that were previously not merely undiscovered but impossible. The decisive implication of this analysis is that constraints are not the enemy of creativity but its precondition, since a space without structure offers nothing to explore and nothing to transform, and that transformation presupposes a deeper command of the space than exploration within it. M. Csikszentmihalyi approaches creativity from a fundamentally different vantage point. On his systems account, creativity cannot be located within the individual mind at all, but arises from the interaction of three elements: the person, who produces variation; the domain, which is the culturally transmitted body of rules, techniques and products; and the field, which comprises the specialists whose judgement determines whether a variation is admitted into the domain. A novel product is not creative simply because it is new; it becomes creative when the competent field recognises its value and incorporates it into the tradition. From this it follows that the question is not only how individuals generate novelty but how the evaluating community operates, and that an account of creativity which

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ignores the field mistakes a social process for a psychological one. The philosophical substance of this disagreement concerns the locus of creativity and, correspondingly, the criterion by which it is to be judged. For Boden the criterion is structural, residing in the relation of the idea to the space of possibilities; for Csikszentmihalyi it is social, residing in the judgement of those qualified to make it. Two further positions clarify the controversy for vocational education in particular. R. Sennett's account of craftsmanship indicates that skilled innovation grows out of prolonged engagement with material and out of repetition, in which resistance and failure become sources of understanding rather than mere obstacles; this supports the ordering of stages proposed above, in which mastery of the invariant precedes variation. The conception of learning as legitimate peripheral participation advanced by J. Lave and E. Wenger indicates that the novice acquires competence by moving gradually towards full membership of a community of practice, which implies that the standards against which student work is measured are those of the professional community rather than of the classroom alone.

CONCLUSION

The study has shown that creativity in the teaching of a technological discipline does not stand in contradiction to its normative character, provided that the constraints of the discipline are understood as defining a design space rather than as excluding design. The methodology of creative teaching accordingly consists not in relaxing technological requirements but in specifying precisely where variation is admissible, on what grounds and after what preparation.

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