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Competency-based pharmacy education: Implementations of performance assessment

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Abstract

Background and Aims: Determining the knowledge and competencies of professionals trained in higher education is crucial for ensuring standardisation and guaranteeing and sustaining quality. The Turkish Council of Higher Education has defined national professional qualifications in the field of pharmacy. Faculties providing pharmacy education are also required to plan and conduct their programmes according to these defined competency outcomes.

Methods: This study will provide examples of assessment practices in the competency-based education (CBE) model adopted at the Istanbul University Faculty of Pharmacy within the framework of these obligations.

Results: The fact that this competency performance assessment system is the first application in Turkey to evaluate the cognitive, affective, and psychomotor behaviours of students studying pharmacy is significant in terms of being a guide and example for national and international pharmacy education. CBE practices, which provide important perspectives in training qualified pharmacists suitable for the needs of both today and the future, also highlight the importance and quality of field and faculty cooperation. The study also offers recommendations to programme developers and implementers.

Conclusion: Considering the difficulties experienced in making fundamental changes in curricula, it is evident that the main requirement is to bring faculty, instructor, student, and external stakeholder collaborations to the table with transparent, measurable, and evaluable criteria in the implementation of such competency-based programmes. Highlighting these dynamics in the programmes to be developed is important for the healthy implementation of the programme.

Keywords Competency Based Education (CBE) · Competency Based Pharmacy Education (CBPE) · Case Based Learning (CBL) · Assessment Practises.

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INTRODUCTION

In recent years, the World Health Organisation (WHO) has recommended the competency-based education (CBE) approach to promote and strengthen quality transformative education based on the needs and demands of populations and health systems. Therefore, the adoption of the CBE approach as an instructional design in the education of 21st-century health professionals has been prioritised (IPF, 2012). This approach to CBE in health professional education aligns with the vision of The International Pharmaceutical Federation (FIP) for pharmaceutical sciences. CBE has been at the centre of the needs-based education cyclical model monitored by the Pharmacy Education Taskforce (PET) of the WHO, United Nations Educational, Scientific and Cultural Organisation (UNESCO) and FIP global pharmacy and the Education Action Plan 2008-2010 (Anderson et al., 2008). FIP supports pharmacy leaders and educators in their efforts to implement CBE by developing and publishing standards such as the FIP Competency Framework and the Global Advanced Development Framework (FIP, 2022; FIP, 2024). The need to improve health services and patient safety in countries (Meijerman et al., 2017), the content and teacher-centred organisation of existing curricula in pharmacy education, and the recent shift in the pharmacist's role from product-focused to patient-focused (FIP, 2012) have necessitated the use of CBE in pharmacy education. This need will require the transformation of traditional educational practises into competency-based pharmacy education, the redefinition of the roles of instructors and students, and the redesign of assessment criteria and many educational activities (Medina et al., 2013; Pearson & Hubball, 2012; Sistermans, 2020; Haloub & Abdelhakim, 2024; Nezhad et al., 2024; Zakeri et al., 2024).

Competency-Based Education (CBE)

WHO defines CBE as "an approach fundamentally oriented towards outcome competencies and organised around competencies to prepare [health workers] for practise" (WHO, 2022). This approach develops competencies that enable health workers to provide effective health services (Katoue & Schwinghammer, 2020). Competencies encompass the knowledge, skills, attitudes, and behaviours that individuals acquire and develop through education, training, and work experience (Brown et al., 2012). The competency framework is usually structured around knowledge or professional expertise areas, and defined levels of expertise are determined in the design of programmes, learning-teaching, and assessment activities (Arakawa et al., 2022). There are globally defined competency frameworks for the pharmacy profession. For example, the competency framework published by PET to ensure global alignment of competencies required for pharmacists is as follows (Anderson et al., 2009; IPF, 2012): a) pharmaceutical public health, b) pharmaceutical care, c) organisation and management, and d) professional personal competencies. Similarly, the European Commission (EC) has developed a European pharmacy competency framework for EC countries, and The European Association of Hospital Pharmacists (EAHP) has published a competency framework for hospital pharmacists in European countries. This framework is as follows (EECPE, 2016; EAHP, 2017): a) patient care and clinical pharmacy skills, b) medicines and their use, c) management, and d) professional competencies. Countries such as Canada, the United Kingdom, and Australia have also presented various competency-based frameworks (APFC [Association of Faculties of Pharmacy of Canada], 2017; NAPRA [The National Association of Pharmacy Regulatory Authorities], 2019).

CBE provides two important visions for higher education programmes. First, it directs professional training programmes towards the real-world application of mastery, knowledge, and skills in the profession. This direction builds a bridge between academics and employers, enabling a better understanding of the knowledge and skills students will need to succeed in work and life. Second, it is used as a tool to improve teaching and student learning, helping quality and affordability co-exist in higher education. When this process operates smoothly, it brings together all stakeholders in the programme (leaders, managers, faculty members) to establish a new balance between quality and affordability (Johnstone & Soares, 2014). Therefore, CBE has garnered significant interest due to the changing educational models needed to address the striking gaps and inequalities in health within and between countries (Frenk et al., 2010).

The CBE programmes in pharmacy education in Türkiye were initiated in 2015 with the introduction of the EczÇEP-2015, national pharmacy core curriculum, which was subsequently approved by the Executive Board of the Council of Higher Education (YÖK) on December 23, 2015. The terms "programme (graduate) competencies" and "pharmacy competencies" were revised in 2019 (EczÇEP-2019) and subsequently merged into a single competency framework. This framework includes both sets of competencies and is divided into two categories: "social competencies" and "technical competencies". The two versions are essentially designed with a single objective in mind: to ensure that the graduates are adequately prepared for their professional responsibilities before graduation through an outcomes-based education programme. For this curriculum to be successful, the courses, practises, assessment and evaluation methods must be aligned with the same goal. The educational models are designed to enhance students' ability

to develop solutions by applying the knowledge and cognitive processes they have acquired, either individually or in collaborative settings. This is achieved by engaging with problems or cases that are analogous to those encountered in real-life scenarios. The models are structured in diverse formats and tailored to align with the specific requirements and levels of learners. It is crucial to provide structured skills training, particularly for the implementation and measurement of the competencies outlined in the two EczÇEPs, which are at skill and learning levels 3 and 4 (YÖK, 2024).

Assessment Practises in CBE

In CBE, it is important to determine whether an individual has achieved the defined competencies during the learning process. To reveal this, it is necessary to bring the learning-teaching process and assessment systems to a process-based approach. When examining the most fundamental features of CBE, it is seen that these are the basic components. The most fundamental feature of CBE is that students must prove their mastery of a skill or competency to move to the next level (Scheopner-Torres, 2022). This proof will be provided by learning environments, as mentioned above. The second fundamental feature is that in CBE, students manage their learning processes within a student-centred approach, so they may need extra time and training if necessary. Under the CBE framework, mastery of competencies and the ability to apply knowledge in practical real-life situations are prioritised, so students cannot progress or be assessed for a new competency until they have mastered the prerequisite materials (Henri et al., 2017). The third fundamental feature is that the assessment of student mastery occurs through skill application. In CBE, the traditional classroom environment is not a prerequisite, and learning can occur in the workplace, during internships, on-the-job training, online, hybrid, or through distance learning (Scheopner-Torres, 2022). Therefore, CBE is an approach that addresses student learning in a multifaceted manner, continuously monitors the student's level with the standards it sets, and focuses on the student's development.

It is possible to divide the main areas of pharmacy education into pharmacy (drug and health counselling; pharmacy management and administration) and pharmaceutical (preparation, development, production, and presentation of pharmaceutical products; quality control). The study will provide examples of assessment practises in the CBE framework within the pharmacy programme.

Case-Based Learning (CBL)

One of the most effective ways to enhance or reveal professional competence in programmes developed within the CBE framework in the health field is CBL and the assessments conducted within this learning approach. This approach is a constructive learning approach in which students select and transform information, construct ideas, and make decisions based on their existing or past knowledge (Brandon & All, 2010). In this approach, instructors help students transition from abstract knowledge to practical applications by solving various case-based problems that arise in real-world situations (Srisawasdi, 2012). The primary goal of CBL in health education is to prepare students for clinical practise through the use of real clinical cases (Thistlewaite et al., 2012). CBL differs from another widely used learning approach in health education, problem-based learning (PBL) (Grauer et al., 2008; Zainal et al., 2024). In PBL, problem-solving, independent learning, and teamwork are encouraged. Instructors typically play a facilitative role, and even if students digress from the topic of instruction, the instructor does not direct the discussion. In the PBL approach, students are usually presented with a problem using a clinical case as a starting point for discussion. Students then have time to tackle and define the problem, explore relevant topics (during/after sessions), and address the problem. In CBL, the group focuses on creative problem-solving with some preparation beforehand. Like in PBL, students are presented with a clinical problem and have time to define and solve it. In CBL, when students start digressing from the topic of instruction, instructors can ask guiding questions to bring them back to the main learning objective, and students can prepare for these sessions in advance (Srinivasan et al., 2007). Additionally, it is argued that CBL allows the instructor to correct the student's incorrect assumptions while trying to solve a clinical problem, which does not always happen in PBL (Dupuis & Persky, 2008). CBL is said to provide more structure for the student in a productive, goal-oriented manner while encouraging the exploration of topics in an open-ended way and promoting discussion and the exploration of uncertainty. CBL helps students focus on the key points of a clinical case, promotes a structured approach to clinical problem-solving, and allows each student to be a "content expert" in a part of the session (Srinivasan et al., 2007).

Many studies in the literature show that CBL contributes to student learning in health education. Studies have shown that CBL deepens student understanding (Kamat et al., 2012; Massonetto et al., 2004), develops critical thinking in questions asked during cases, teaches working with the group (McLean, 2016), and increases students' capacity to analyse cases (Tsekhmister, 2023). Additionally, in the study of Jacob et al. (2019), instructors involved in pharmacy education stated that CBL plays an important role in facilitating students' understanding of technical scientific concepts, developing

problem-solving skills, and being an approach that directly relates course materials to practical outcomes. Similarly, in the study by Kaur et al. (2020), it was found that there was an increase in student participation in CBL sessions in the pharmacy faculty, most students thought that CBL was a better teaching-learning method, and instructors observed that students were more engaged and motivated.

Objective Structured Practical Examination (OSPE)

OSPE is an assessment system in pharmacy education that objectively and systematically evaluates students' knowledge and skills, similar to the objective structured clinical examination (OSCE) used in medical education for assessing clinical skills (ABC of Learning and Teaching in Medicine, 2010). OSPE includes assessments conducted through direct observation of real (internships, in-service training courses) or simulated practises (magisterial laboratories). This makes it a suitable assessment method for evaluating programme and professional competencies in practical and patient-focused pharmacy education. OSPE focuses on evaluating students' practical skills such as patient counselling, prescription control, drug preparation, and distribution. During this assessment process, students' decision-making, communication, and ability to correctly perform procedures within the pharmacy are observed. OSPE provides objective feedback on the quality of the learning and teaching process by allowing the evaluation of students' knowledge, skills, attitudes, and behaviours as a whole. This feedback can contribute to the sustainability of programme quality.

In OSPE, task centres limited to specific contexts can be presented to students in stations. Examples of this are provided below:

- *Medication counselling station:* The evaluation is aimed at topics such as patient adherence to treatment, drug efficacy and safety, usage instructions, dosage information, and drug interactions through patient simulation. Students' communication skills, knowledge, skills, and attitudes in ethics, deontology, and legislation can also be evaluated.
- *Prescription control station:* The evaluation is based on rational drug use principles through the prescription given to the student. This station is functional in drug interactions and dosage evaluation.
- *Pharmaceutical/magisterial preparation station:* The student's skill in preparing and packaging pharmaceutical/magisterial preparations under sterile or non-sterile conditions is observed.
- *Pharmaceutical calculation station:* The student is expected to perform the necessary dosage calculations in a simulated environment.

To increase the validity and reliability of the OSPE, students must be subjected to the same stations and the same assessment criteria. Feedback should be provided to students in OSPE practises. Virtual/augmented reality environments can also be used in these practises. The instructor should be careful in these aspects in the OSPE. Within the scope of OSPE, structured oral exams (SOE) are used to evaluate students' professional competencies in a real and standardised environment during internships conducted throughout the pharmacy undergraduate education (Amiel et al., 1997).

CBL Practises

These assessment practises can be used both with the aim of measuring the existing knowledge and skills of the student and as a tool for learning (assessment as/for learning) (Chiranjeevi et al., 2022; Daugherty et al., 2024). CBL practises can encompass both intra-disciplinary and interdisciplinary knowledge and skills in a spiral manner. CBL practises can be arranged progressively as prerequisites for each other.

In the study, scenarios that can be used in CBL and checklists that will enable the evaluation of these scenarios are provided as supplementary material:

- *Pharmaceutical scenarios:* These are assessment practises conducted through scenarios involving multiple disciplines that question the competencies and skills of the pharmacist in the design, development, production, storage, and presentation stages of drugs, cosmetics, medical devices, and herbal medicinal products: Pharmaceutical logistic (Suppl. Mat. 1), Dark side of glowing skin (Suppl. Mat. 2), Patient's itchy puzzle (Suppl. Mat. 3), I went blind (Suppl. Mat. 4), Limit on quality (Suppl. Mat. 5), Online form (Suppl. Mat. 6), and Out of limit (Suppl. Mat. 7).
- *Pharmacy scenarios:* These are assessment practises conducted through scenarios involving multiple disciplines that question the competencies and skills of the pharmacist in providing patient-centred pharmacy services within the framework of pharmaceutical care/clinical pharmacy principles for drugs, cosmetics, medical devices, and herbal medicinal products: Coloured pencils (Suppl. Mat. 8), Flames (Suppl. Mat. 9), Mrs. Chubby (Suppl. Mat. 10), Put on a blue tie (Suppl. Mat. 11), and Single breath (Suppl. Mat. 12).

Supporting documents used in the conduct of CBL studies and belonging to students and instructors are provided in Suppl. Mat. 13: Competencies for CBL-Pharmaceutical, Compe-

tencies for CBL-Pharmacy, Name badges, Instructor guide, Warm-up techniques, Competency assessment for CBL-Pharmaceutical, Competency assessment for CBL-Pharmacy, Student feedback form, Self-assessment form for instructor.

DISCUSSION AND RECOMMENDATIONS

Determining the knowledge and competencies of professionals trained in higher education is important for revealing the quality of education. One of the practises that reveal this situation is the practises related to assessing these competencies. The assessment of competencies and skills also allows for updating the national and international requirements of the profession. This situation accelerates the applicability of new instructional practises in pharmacy education. The transition to competency-based education programmes in pharmacy education, where field and faculty cooperation is very important, will play an important role in training the qualified pharmacists of the future who have acquired the necessary knowledge, skills, attitudes, and behaviours of the profession. It is thought that the examples of practises shared within the scope of this study will guide the practises in the educational programmes to be developed for training the pharmacists needed in our era. These examples will also guide institutions that train students in different professions, not just pharmacy education.

The challenges that may be encountered in CBL practises are as follows: not clearly defining the goals, adopting a didactic teaching process that ensures the recall of knowledge and having student groups accustomed to this teaching process, having differences in student levels and this negatively reflecting on group work, not having active participation of all students in the group, inadequate group management and insufficient feedback on student performances, the scenario not being designed in a way that is compatible with the programme, meaningful enough, and suitable for competencies, the inadequacy of the physical environment, the large number of students, and the lack of appreciation and motivation.

Considering the difficulties experienced in making fundamental changes in curricula, the collaboration of faculty-instructor-student in the rapid implementation of such competency-based programmes, the readiness of the administration and instructors for change, their ability to adapt to this change, and the educational facilities of the university and faculty are important. Highlighting these dynamics in the programmes to be developed is important for the healthy implementation of the programme.

For future research, researchers can conduct experimental studies using the teaching materials presented in this research. Students' opinions can be used to reveal the efficiency of the experimental studies in depth. In addition, the opinions of faculty members can be taken for the dissemination of the implementation of performance assessment techniques in pharmacy education.

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