JOINER

JOURNAL OF INCLUSIVE EDUCATIONAL RESEARCH

Vol. 4, No. 1 · JUNE 2024

ISSN: 2980-3047

OPEN ACCESS

joinetr.com

JOURNAL OF INCLUSIVE EDUCATIONAL RESEARCH

Volume 4, Issue 1, 2024

Editor-in-Chief: Prof. Dr. Hasan KARAL, Prof. Dr. Fahriye ALTINAY, Assoc. Prof. Dr. Ali Kürşat ERÜMİT
Editor: Prof. Dr. Hasan KARAL, Prof. Dr. Fahriye ALTINAY, Assoc. Prof. Dr. Ali Kürşat ERÜMİT
Publisher Editor: Prof. Dr. Hasan KARAL, Prof. Dr. Fahriye ALTINAY, Assoc. Prof. Dr. Ali Kürşat ERÜMİT
Layout Editor: Dr. Gülbahar Merve ŞILBIR
Redaction: Dr. Gülbahar Merve ŞILBIR
Typographic: Dr. Gülbahar Merve ŞILBIR
Cover and Page Design: Dr. Gülbahar Merve ŞILBIR
Contact: Assoc. Prof. Dr. Ali Kürşat ERÜMİT

JOINER is published regularly twice a year since 2021.

Contact Information

Web: http://joinetr.com/
E-Mail: journal.joiner@gmail.com
Adress: Trabzon/Turkey

Table of Contents

Job Satisfaction and Academic Staff Performance Assessment in Higher Education

Tonzeah N. Zarwolo[1]

Article History
Received: 13.12.2023
Received in revised form: 27.06.2024
Accepted: 28.06.2024

Abstract

Employees receive feedback on their work via a formal procedure called a performance assessment or evaluation, which also serves as a basis for subsequent compensation and advancement. Employee satisfaction and performance are vital to an organization. Increased productivity and better performance would follow from happier employees. A university is a place where students can learn and develop their expertise in a range of areas. It is essential to understand that academic happiness creates exceptional performance for the university. Research on job satisfaction and performance thus becomes more well-known. This study discusses both intrinsic and extrinsic factors that influence job satisfaction, such as advancement, connections with coworkers, the working environment, job security, and pay. Both written and contextual performance will be considered in the assessment of work performance. The three areas into which the evaluation standards for academic employees at universities and colleges can be separated are teaching, research, and service. Teaching is the academic staff member's primary responsibility. Both the content and the method of instruction are part of teaching. Because academic staff at universities are not evaluated based on students' evaluations of teachers' effectiveness (SETE), the attitudes and actions of the staff members toward students in the classroom, which ought to be the focus of performance appraisals and evaluations, are not assessed. University lecturers work in an emotionally demanding field that demands a high degree of emotional literacy and intelligence to foster an environment favorable to learning and teaching. As a result, it is important to evaluate these individuals' emotional competence. Furthermore, the study investigates the impact of information technology (IT via a performance management system (PMS on the operational and financial performance of higher education institutions. Only if it is done through a PMS will the use of IT capabilities be noticeable. PMS has the power to intervene and change how an organization performs. The quantitative research design will be used for this study. The researcher chooses to use this design because the researcher will collect primary data by means of a scale or a structured questionnaire from the Academic staff at the African Methodist Episcopal Zion University in Liberia which is the study area of this research. This study's contribution to the advancement of science relates to the empirical evaluation of IT capabilities. Theoretically, to accomplish the aims and objectives of higher education institutions (HEI, some components of IT and PMS must be enhanced. This is consistent with the principle of goal-setting. The practical benefit of this research for HEI management is to raise productivity through the creation and application of an ideal PMS backed by IT.

Keywords: Job satisfaction, performance assessment, academic staff, higher education, information technology

1. Introduction

According to a meta-analysis, there could be both advantages and disadvantages to the association between employee satisfaction and performance, according to W. Chandrasekara (2019). Nhung, T. T. K., & Do, N. T. (2020) demonstrated the positive association frequently linked to the human relations movement between job satisfaction and performance assessment. Job satisfaction and work performance are positively connected, and several variables, including autonomy, moral responsibility, norms, self-concept, and cognitive accessibility, may have an impact on this relationship. Bargsted et al. (2019). Academic personnel and the institution itself are necessary to create a positive campus environment that promotes student cooperation and benefits the overall

[1]Faculty of Educational Science, Near East University, Liberia, zarwolotonzeahn@gmail.com

educational process (Reduan, I. et al., 2023). A pleasant campus environment will boost productivity, enhance the university's learning environment, and make faculty members happier in their jobs. Academic productivity and career success will improve in conjunction with a rise in job happiness. Academic professionals' job satisfaction and performance assessment have a good and substantial relationship H. I. H. Abdirahman et al. (2020). Historically, higher education policymakers and administrators have given performance management, especially the element of academic performance appraisal inadequate consideration. It appears, therefore, that its contribution to raising institutional performance and quality has been overlooked. Universities adopted a loose approach to performance evaluation, failing to adequately evaluate the effectiveness of academic staff members in the classroom. O. F. Al-Kurdi, O. F. et al. (2020). The key success labels for academic staff that prioritize research publications and paper presentations at conferences over in-class performance are insignificant, according to the study's authors. The observation that enforcing these criteria has led academics to overlook their primary duty, which is providing top-notch instruction, supports this position. Hearing from students about all facets of their experiences in postsecondary education is crucial since they are the ones who directly use the services that universities provide Rashidi et al., (2023). In the United States, student feedback on a faculty member's instruction plays a factor in the evaluation of that member's performance. This also holds for countries across Europe, according to Yidana et al. (2023). For countries across Africa, the use of student evaluations of teachers has not yet occurred when evaluating academic staff in higher education institution White, E. P. G., et al. (2023). Many institutions take into account a variety of variables when evaluating academic staff for tenure and promotion, including qualifications, teaching, current research, publications, and service to the school and community. However, most academic development and incentives programs in underdeveloped nations focus on high-quality research Chatio, S.T., et al. (2023). These ethical standards, along with other relevant contents and situations, should be taken into consideration for job satisfaction and performance evaluation of university instructors. They must possess an extensive understanding of both the content they are instructing and successful tutoring techniques because teaching is their primary concentration, along with the institutions. The study also highlighted the importance of information technology (IT), which is crucial for managing knowledge management, financial performance, and worker productivity in the face of modern performance evaluation in organizations. Despite the widespread use of IT, many organizations still do not make use of all that it can offer to improve internal operations. Prior research has demonstrated that utilizing IT to support organizational resources such as a performance measurement system (PMS) can offer guidance on low-cost solutions, enhance product efficiency, and fortify organizational abilities. Higher education management may benefit from using performance data and PMS to their advantage to take the right actions toward achieving organizational success, according to Hsiao, P. C. K., et al. (2023). This study investigates how Higher Education Institutions (HEIs) might improve their IT proficiency through the use of the Performance Management System (PMS). To increase academic staff efficacy and institutional growth metrics like graduate rates, research production, and teaching quality, it highlights the necessity of effective job satisfaction and performance assessment models.

2. Method

The quantitative research design is used for this study. The researcher chooses to use this design because the researcher collected primary data by means of a scale or a structured questionnaire from Academic staff at the African Methodist Episcopal Zion University which is the study area of this research. The research used two scales to collect the responses from the study participants. These scales were developed and validated which make them ideal for the study. For Academic staff performance, the scale that was used was developed by and titled" Mawoli, M. A., & Babandako, A. Y. (2011). An evaluation of staff motivation, dissatisfaction and job performance in an academic setting. Australian Journal of Business and Management Research, 1(9), 1. The second scale is on Job Satisfaction. It was developed by and titled "Al-Rubaish, A. M., Rahim, S. I. A., Abumadini, M. S., & Wosornu, L. (2011). Academic job satisfaction questionnaire: Construction and validation in Saudi Arabia. Journal of Family and Community Medicine, 18(1), 1. According to the records of the Human Resource Department of the African Methodist Episcopal Zion University, there are 115 Academic staff at the University. According to Krejcie and Morgan, 1970 at a 95% confidence interval and 5% margin of error, a total of 92 persons were selected from the population of 115. The researcher used the simple random sampling technique, which is a probability sampling technique. This technique is unique to the researcher because every academic staff had an equal opportunity of being included in the sample which will be ideal for inferences and avoiding biases. The researcher used the Google form to collect responses from the participants. The form was sent through their institutional email addresses.

3. Findings

Ninety-two academic staff members answered the survey after data collection. The responders were from AME Zion University academic departments that were chosen at random.

According to the findings, 76.8% of the 92 respondents who make up 100%, are academic staff members who are generally satisfied with their jobs. 23.2% of academic staff members are dissatisfied with their jobs, largely

due to low salaries among other reasons. It's also noteworthy that academic employees valued job safety more, with a sum of 73.1%.

The following six key responses were given by the respondents: low wage = 74.6%, job timeliness = 84.5%, fair university policy = 66.3%, reward for performance = 73.1%, employee relationship at work = 79.3%, and opportunities for promotion = 66.3%.

The findings reveal some intriguing commonalities among the participants about their degree of job satisfaction and appraisal.

4. Discussion and Conclusion

In an academic setting, the study looks into staff satisfaction and performance. Despite their modest pay, employees were found to be highly motivated by a variety of possibilities. The outcome implies that AME Zion University staff members place a high value on staff motivation, which benefits both sides equally. Employee job satisfaction increases organizational productivity. According to the study's findings, employee performance and work satisfaction are directly impacted by employee motivation. Academic staff performance and work satisfaction can be directly or indirectly impacted by job motivation. Consequently, it can be claimed that raising motivation at work is one strategy to enhance job satisfaction and performance based on these findings. The study discovered that academic staff members' job happiness and performance are positively correlated with their level of job motivation. The study also revealed that the primary factors influencing job satisfaction and performance are pay, safety, advancement and rewards for performance, clear policies, employee relationships, and job timeliness.

The study aims to examine the effect of job satisfaction and performance assessment in higher education. This research was conducted at a private university in Monrovia Liberia. The result of this research indicates that academic staff members 'motivation level is positively connected with their job satisfaction and performance. Workplace productivity is increased when employees are happy with their jobs.

The literature suggests that performance appraisals and evaluations in universities and colleges in developing countries are yet to modernized, as they prioritize conference paper presentations and publications over classroom performance. The use of SET (Self-Evaluation Theory) in performance appraisals is inadequate, as it does not assess the behavioral skills that are crucial for effective interactions between professors and students. This lack of consideration for emotional intelligence and literacy in performance appraisals may lead to a lack of emotional maturity for academic work.

The study also examines the impact of Information Technology (IT) through a Performance Management System (PMS) on financial and operational performance in Higher Education institutions. The study indicate that IT capabilities do not support organizational performance financially and operationally. Instead, IT capabilities can only be impacted through a PMS intervention. The research contributes to the development of science related to empirical testing of IT capabilities and aligns with the goal-setting theory that IT and PMS aspects must be optimized to achieve the goals and objectives of Higher Education Institutions (HEIs). The practical contribution of this research is to improve performance through the development and implementation of optimal PMS supported by information technology in HEIs.

5. Recommendation

Based on the research's findings, several recommendations for enhancing the source university's current PMS are provided in this section. First and foremost, a distinct link or links should be established between the PMS and incentives, rewards, pay increases, etc. It is important to acknowledge and reward those who perform well, both financially and non-financially. Equitable weight should be given by the PMS to the research and publication as well as the teaching performance. Rather than selecting appraisers only based on the school administration's approval, it is preferable to select them based on the consensus of the majority. In addition, appraisers ought to be replaced regularly. To minimize the amount of paperwork, it is advised to adopt a well-organized electronic procedure of evaluation. The PMS-PA form should be updated depending on the suggestions made by academic staff members. It is preferable to carry out the Performance Assessment Process once a year in a clear, well-managed, and structured setting. By focusing on the growth of appraises, the PAP should offer objective, reasonable comments.

References

Abdirahman, H. I. H., Najeemdeen, I. S., Abidemi, B. T., & Ahmad, R. (2020). The relationship between job satisfaction, work-life balance and organizational commitment on employee performance. Advances in Business Research International Journal, 4(1), 42-52.

Al-Rubaish, A. M., Rahim, S. I. A., Abumadini, M. S., & Wosornu, L. (2011). Academic job satisfaction questionnaire: Construction and validation in Saudi Arabia. Journal of Family and Community Medicine, 18(1), 1.

Bargsted, M., Ramírez-Vielma, R., & Yeves, J. (2019). Professional self-efficacy and job satisfaction: The mediator role of work design. Revista de Psicología del Trabajo y de las Organizaciones, 35(3), 157-163.

Chandrasekara, W. S. (2019). The effect of transformational leadership style on employees Job satisfaction and job performance: A case of apparel manufacturing Industry in Sri Lanka. International Journal of Economics, Commerce and Management, 7(7), 385-393.

Chatio, S. T., Tindana, P., Akweongo, P., & Mills, D. (2023). Publish and still perish? Learning to make the 'right'publishing choices in the Ghanaian academy. Higher Education Research & Development, 1-14.

Hsiao, P. C. K., Low, M., & Scott, T. (2023). Service performance reporting and principles-based authoritative guidance: an analysis of New Zealand higher education institutions. Meditari Accountancy Research.

Mawoli, M. A., & Babandako, A. Y. (2011). An evaluation of staff motivation, dissatisfaction and job performance in an academic setting. Australian journal of Business and management research, 1(9), 1.

Nhung, T. T. K., & Do, N. T. (2020). An extension of Vroom's expectancy theory (1964) in examining lecturers' motivation in Vietnam. VNUHCM Journal of Economics, Business and Law, 4(1), 490-499.

Reduan, I., Sabli, H. M., & Adenan, A. (2023). The Factor Affecting Academic Staff Satisfaction at TVET Institutions. Borneo Engineering & Advanced Multidisciplinary International Journal, 2(Special Issue (TECHON 2023)), 174-179.

Tamimy, M., Rashidi, N., & Koh, J. H. L. (2023). The use of cooperative learning in English as foreign language classes: The prevalence, fidelity, and challenges. Teaching and Teacher Education, 121, 103915.

White, E. P. G., Okkonen, J., Oksa, R., Ghansah, B., Yarkwah, C., Kwaa-Aidoo, E., ... & Twum, R. (2023, August). Approaches to leveraging digital higher education in Africa. In Proceedings of the 6th ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies (pp. 152-154).

Yidana, P., Adabuga, J. A., Gariba, A., & Bawa, G. M. (2023). Evaluation of administrative support services for quality assurance in higher education: Empirical review. Journal of Advanced Research and Multidisciplinary Studies, 3(1), 87-104.

Current Approaches in Medical Pharmacology Education

Dilşat Çamaş[1]

Article History
Received: 22.06.2024
Received in revised form: 28.06.2024
Accepted: 29.06.2024

Abstract

The development of technology, the spread of online education and generally updated information in educational science also contribute to the development of medical education. Medical Pharmacology is seen as the basic discipline of health-related undergraduate and graduate departments, especially the preclinical period of medical faculties. Current research has shown that medical and health profession graduates (pharmacy, nursing, veterinary, biomedical, etc.) have difficulties in basic pharmacology knowledge and in their ability to apply what they have learned in pharmacology classes in practice. Also, factors such as the development of the science of pharmacology every year, the addition of new drugs to the curriculum, and the constant change of treatment guidelines make learning pharmacology difficult. In addition, pharmacology educators play an active role at the undergraduate and graduate levels at the intersection of clinical and preclinical. Therefore, it is increasingly important for pharmacology educators to make lessons active and understandable. Academicians who advocate the necessity of a current change in pharmacology education are conducting various studies on this subject. In this review, studies carried out in recent years to improve pharmacology education and expert opinions are brought together.

Keywords: Pharmacology, medicine, education

1. Introduction

Pharmacology is a branch of science with a broad field of study, such as the physical and chemical properties of drugs, their effects on the body, and their interactions with other drugs (Rivera & Gilman, 2011). Therefore, knowledge and practice of pharmacology has a unique role in the safe prescribing and administration of medications (Fasinu & Wilborn, 2024). Pharmacology is one of the basic courses of medicine and health-related branches, and with its structure that changes and develops day by day, it is a difficult but necessary course to learn. Lecturer-based learning (LBL) has been applied in pharmacology, as in every subject, for many years. Today, the most frequently used method in medical faculties around the world is the classical LBL. However, it has been observed that learning progressing through classical lectures in the classroom environment is insufficient (Fu et al., 2022; Zeng et al., 2020). Because pharmacology is a branch where new information is added to the curriculum every year with its constantly changing and active structure. Developments in the pharmaceutical industry reveal new active ingredients and treatment methods. It also includes microscopic concepts such as receptors, interaction of cells with drugs, and molecular chemical structures. In this sense, the constant change and the increase in the subjects to be learned, as well as the difficulty of learning the subjects, have forced educators and researchers to search for new learning methods. With the development of technology, new teaching methods applied in all fields of educational sciences have also begun to take place in pharmacology. The aim of new methods should be to learn how to learn, not just to memorize the subjects (Guilding et al., 2023). In addition, these methods can be applied in combination rather than alone, so that each student can find his or her own unique method (Xiao et al., 2023). Our aim in this study is to compile and guide the newly produced learning methods and related research. Our research problem is "What are the current approaches in teaching pharmacology?".

[1]Samsun Training and Research Hospital, Samsun, TURKEY, drdilsaterumit@gmail.com, orcid: 0000-0002-9623-5298

2. Method

We implemented the method as document analysis. PubMed which a free search engine that accesses the most widely used and well-known medical, biomedical and life sciences databases in the world has been used. All randomized controlled studies, reviews and meta-analyses covering the topics of "Pharmacology" and "Education" published between 2019 and 2024 has been evaluated. We found 18,458 studies. There were records excluded after abstract screening. There are many different topics related to "education" in the medical literature. For example, since it is possible for a cell to differentiate into another cell or "learn" to fight infection/cancer by training it with drugs or genetics, we excluded such content. We only found studies that included topics related to pharmacology education at undergraduate and graduate levels. When studies that meet our criteria are selected, team-based learning (TBL), problem-based learning (PBL), personalized learning (PL), integrative technologies (IT), case-based learning (CBL) and flipped classroom (FC) methods contribute to the development of pharmacology education. These methods were used in combination from time to time and had been in the official curriculum for a while. Gamification and artificial intelligence (AI) have been in the spotlight over the last decade (Figure 1).

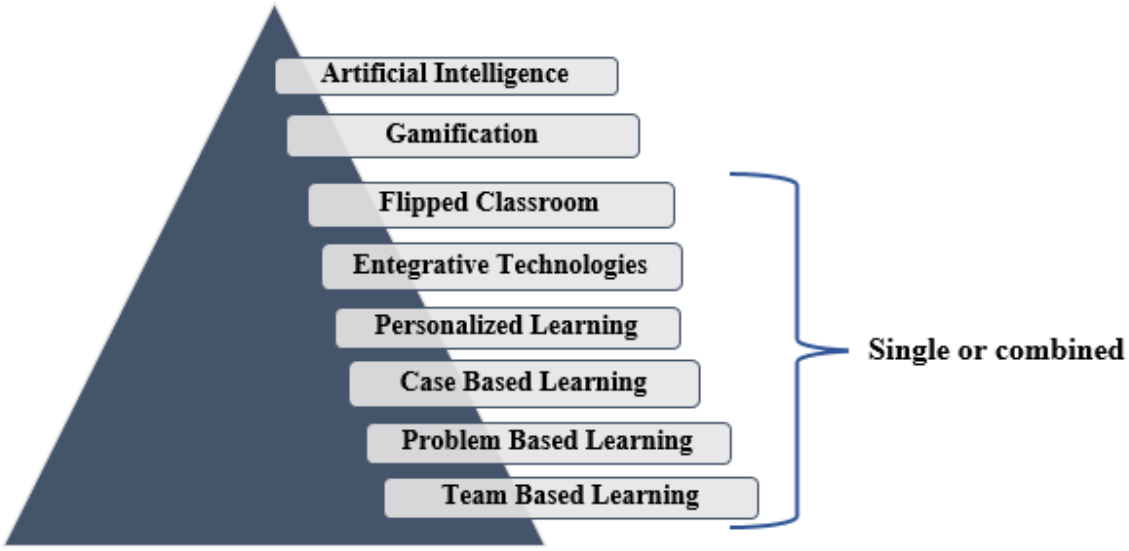

Figure 1. New training methods in pharmacology

3. Findings

As in every discipline, revision has been needed in pharmacology education over time. With the constant renewal of existing information and the difficulty of keeping up with developing technology, learning models have also changed and traditional LBL has become outdated and inadequate. For this reason, modern learning methods such as TBL, PBL, PL, IT, CBL and FC that contribute to the development of pharmacology education, attract attention. We took these methods, which started to take their place in the curriculum and are sometimes applied in combination, as a single title and examined gamification and AI, which have come to popular in recent years, separately.

3.1 Some modern learning methods

TBL has been first designed as an effective method based on teamwork by Dr. Larry Michaelsen for use at the University of Oklahoma (Michaelsen, 2004). In this method, firstly, the students has been individually familiarized to subject with lectures given by instructors, literature reviews, books and other materials. Then, the information is reinforced by applying a pre-test. Finally, they are given the opportunity to solve problems, reinforce their knowledge, and discuss the issues they defend in small groups. This method has been frequently applied in pharmacology education and according to studies it has been observed that effective learning is provided. Positive results has been obtained, especially when the test achievements of low-performing students were compared before and after TBL (Carrasco et al., 2021). For a course as dynamic and broad as Pharmacology, TBL provides a collaborative environment for team members to grasps drug names, mechanisms, and adverse effects that may be difficult to learn individually. Through several studies, TBL has been shown to be as effective and sometimes better than traditional pharmacology (Dunaway, 2005).

PBL is a method of learning by identifying a problem, conducting appropriate research, reasoning, and discussing information in groups, as in TBL. The most important distinguishing feature of PBL is that it not only teaches students a certain subject but also provides them with general problem-solving competence. According to studies, PBL has also yielded positive results in the field of pharmacology, has increased interest in learning, has strengthened team spirit, providing effective communication and improving students' problem analysis and problem-solving skills (Liu et al., 2019).

Another innovative learning method was PL. As it is known, the traditional classroom structure is a uniform system that forces each student to adapt. In PL, the aim is to provide education to the student according to his/her own interests and learning speed by using various technologies and simulations in the classroom. PL, which can also be used as a tool in the medical curriculum, is a method that facilitates learning drug names, mechanisms of action, clinical applications, etc., and provides time and location flexibility (Fidalgo-Neto et al., 2014).

In IT, there is a connection to a central unit via computer or mobile devices and support from video clips, e-books and online quizzes. There are studies in the field of pharmacology showing that it is beneficial to use it especially to make the contents attractive (Gudadappanavar et al., 2021).

The CBL method is another efficient way of learning. Its effectiveness as both a traditional and integrative learning method has been demonstrated in many studies. CBL is based on solving scripted cases by discussing and facilitates learning in a wide range of areas, from the pathophysiology of the disease to its symptoms, pharmacotherapy and side effect profile, and provides the student with problem-solving skills, as in PBL (Özdener et al., 2020; Tayem, 2013).

Another learning method that has attracted attention in recent years is FC. In this method, first of all, by taking advantage of technological developments, the student studies the subject with videos and materials before the lesson. Then, assignments are given as in the traditional method, and these assignments are done individually or as a team in the classroom. In this way, the educator teaches and assigns homework as in the traditional method, and the student is enabled to understand the lesson in his own way by making use of technology. The biggest difference here is that the lesson is learned outside the classroom and the homework is done in the classroom under the control of the educator. There are studies showing that it is used alone or in combination with other methods in medical and pharmacology education and increases test success (Lockman et al., 2017; Zhang et al., 2019).

3.2 Gamification

Another method that can be used to make learning attractive is gamification (Morris et al., 2013). In recent years, interest in LBL has decreased as students benefit from different learning methods. Especially with the impact of the pandemic period, the rapid advancement of computer and interactive technologies in education has been opened. The use of game elements (e.g., points, leaderboards, rewards) in non-game contexts is called gamification or “gamified learning” (van Gaalen et al., 2021).

The tournament called "Pharmacotrophy" held at the Paris Faculty of Pharmacy in 2021-2022 is a good example of this. In 2021-2022, students' exam results were evaluated with online and face-to-face races using Kahoot. Questions were prepared from various subjects in the pharmacology curriculum, aiming to both understand the subjects and motivate learning through competition. After the tournament, the effectiveness of the method was tried to be measured by collecting feedback from students and educators with an online survey. In particular, students emphasized that this method is motivating and supports teamwork. In addition, among the students who received similar exam success scores in previous years, those who participated in the tournament received 20.1% higher scores than those who did not participate (Delage et al., 2024).

3.3 The role of Artificial Intelligence (AI) in medicine and pharmacology education

Today, the impact and rapid progress of Artificial Intelligence (AI) is indisputable. The use of AI is supported in medical science and education, as in every field. It has consolidated its place in higher education, especially since the launch of ChatGPT in November 2022. For this reason, the potential benefits and challenges of using ChatGPT in medical education continue to be investigated. First of all, medicine and pharmacology education is a challenging discipline that requires memorizing a large amount of information in a short time and staying up to date. At this point, with ChatGPT, students can easily and quickly search for information on any subject, allowing them to better understand complex concepts. Additionally, ChatGPT offers a personalized learning experience by analyzing the student's learning style and individual needs. In addition, through clinical simulations, it also provides the opportunity to benefit from the experiences of others and receive real-time feedback about the decisions they will make when they step into the profession (Feng & Shen, 2023).

But what is important is when and how students and faculty will use it rather than whether they will benefit from it. Although AI has the potential to revolutionize medical education, it should be noted that it cannot replace human expertise and interpretation ability. It should be aimed that students do not dull their critical thinking and idea generation abilities while completing assigned assignments, and faculty members must maintain honesty and professionalism. Additionally, legal liabilities such as producing biased content and copyright issues should be

avoided. It is suggested that AI should only become a tool that makes teaching easier and more interesting. As a result, medical educators can leverage the power of ChatGPT to create innovative and effective learning experiences for the next generation of medical students (Patel et al., 2023).

In a study conducted in 2024, various examination systems in medical pharmacology education were tested and learning objectives were determined by using three AI platform named Sage Poe, Claude-Instant and ChatGPT. Accordingly, it was designed to generate questions, administer tests and evaluate exam results to measure students' knowledge about hypertension. It was observed that the artificial intelligence platforms in this study produced quality test items suitable for different evaluation purposes and achieved similar results except for minor changes. In this way, it is thought that artificial intelligence tools can be valuable in terms of quickly creating quality exam methods and time management (Sridharan & Sequeira, 2024). However, some of the data obtained were found to contain errors. Considering that artificial intelligence tools can also reach incorrect or biased information, test results still need to be checked by an expert. As a result, with advancing technology, it has been suggested that artificial intelligence be integrated into the medical curriculum to support both students and educators.

Again, a recent study addressed the pros and cons of using ChatGPT in medicine, dentistry, pharmacy and public health education. For this research, various guidelines were created based on expert opinions and literature in these four disciplines. These guidelines have featured the advantages and concerns of using ChatGPT. In short, it has been accepted that the use of ChatGPT in medicine, dentistry, pharmacy and public health education has advantages in areas such as personalized learning, easier understanding of complex concepts, creating case scenarios and receiving instant feedback, data analysis and rapid literature review. In addition, it was emphasized that it is still approached with skepticism due to limitations such as data confidentiality, the risk of obtaining biased and incorrect information, and the decrease in students' critical thinking and communication skills (Sallam et al., 2023).

4. Discussion and Conclusion

As a result, pharmacology represents the fundamental discipline of health-related professions. In other words, it is not possible to be successful in professions such as medicine, nursing, pharmacy, dentistry and veterinary medicine without having accurate and complete knowledge of pharmacology. In addition, it is a fact that the classical education method is inadequate due to the fact that the science of pharmacology has a constantly changing, developing and growing content, and that it is one of the most difficult courses for students since it is already a complex field. For these reasons, a revision in pharmacology education will be inevitable. In addition to traditional methods, it is necessary to turn to technology-based methods that are suitable for each student's learning method, are interesting and facilitate memory retention. Additionally, further studies are needed to increase and develop these methods. It will make a great contribution to science if researchers interested in both pharmacology and educational sciences increase their studies in this direction and develop this field (Guilding et al., 2024).

While innovative and technological methods are being increasingly integrated into the clinical courses of medical schools, traditional methods are still mostly applied at the preclinical stage. On the other hand, using technology in pharmacology, which is an applied science, can lead us to more accurate drug prescription and treatment. Developments in technology and its reflection on education have gained importance in the last decade. Especially during the pandemic period, the necessity of technology for education has become indisputable. At this point, inequality between countries comes to the fore. In regions where there is not sufficient internet access, the quality of education decreases dramatically. Some international projects such as the Pharmacology Education Project (PEP) are needed to reach technology in these regions and ensure that students receive up-to-date pharmacology education (Faccenda et al., 2019). It is possible to apply new training methods not only alone but also in pairs or multiples. According to a study comparing training techniques, PBL and CBL combined is the method that increases test success the most. In addition, TBL and FC are methods that significantly increase both student satisfaction and course success (Xiao et al., 2023). In general, student satisfaction with new methods is higher than traditional education.

In particular, TBL provides contributions such as communication skills, critical thinking and team spirit through peer-level teaching. In a study with pharmacy students, the impact of TBL was evaluated through a post-lesson survey. Student satisfaction, comprehension and class participation increased (Attia & Mandour, 2023). In a dental school, TBL was also evaluated by both students and lecturers. Students stated that they learned faster and lecturers stated that their classroom performance increased (Chen et al., 2022). In another study, it was observed that the success of low-achieving first-year medical students increased after TBL (Kim et al., 2020). On the other hand, in a study comparing TBL and LBL, student satisfaction was higher in TBL, but there was no significant difference in terms of test success (Nguyen et al., 2016).

A structured questionnaire and prescription samples were used in a study comparing PBL and LBL. Accordingly, it was observed that with PBL, students' knowledge increased and they wrote more accurate

prescriptions (Brinkman et al., 2021). However, in another study a year later, there was no significant difference in test success between PBL and LBL, although student satisfaction was higher (Sushama et al., 2022).

In a study in which third-year medical students were surveyed about CBL, it was stated that the curriculum was quite satisfactory (Özdener et al., 2020). In parallel, many studies have shown that student satisfaction is high in CBL (Hasamnis et al., 2019; MEIRA et al., 2022). In addition, it was observed that test success increased in studies comparing CBL and LBL (Chiranjeevi et al., 2022; Tushar et al., 2020).

Additionally, there is a need for studies comparing these methods with each other in more detail. Over time, technological methods and especially AI and gamification will begin to take more part in education. It should be aimed to achieve a standard and ideal training method in medical pharmacology education by conducting more randomized controlled studies. To our knowledge, there is no study in which cost-effectiveness analysis has been conducted on this subject. Since efficiency is also important economically today, studies in this field are needed.

References

Attia, R. T., & Mandour, A. A. (2023). Team-based learning-adopted strategy in pharmacy education: pharmacology and medicinal chemistry students' perceptions. *Future Journal of Pharmaceutical Sciences*, *9*(1), 15.

Brinkman, D. J., Monteiro, T., Monteiro, E. C., Richir, M. C., van Agtmael, M. A., & Tichelaar, J. (2021). Switching from a traditional undergraduate programme in (clinical) pharmacology and therapeutics to a problem-based learning programme. *European journal of clinical pharmacology*, *77*, 421-429.

Carrasco, G. A., Behling, K. C., Gentile, M., Fischer, B. D., & Ferraro, T. N. (2021). Effectiveness of a Team-Based Learning exercise in the learning outcomes of a medical pharmacology course: insight from struggling students. *Naunyn-Schmiedeberg's Archives of Pharmacology*, *394*(9), 1941-1948.

Chen, D., Yue, H., Liu, S., Meng, L., & Yin, W. (2022). The introduction of team-based learning into the clinical pharmacology section of the endodontics clinical course. *Clinical and Experimental Pharmacology and Physiology*, *49*(9), 998-1001.

Chiranjeevi, U. K., Gedela, V., & Rao, G. H. J. (2022). A comparative study of case-based learning with conventional teaching in undergraduate training of pharmacology. *National Journal of Physiology, Pharmacy and Pharmacology*, *12*(5), 712-716.

Delage, C., Palayer, M., Lerouet, D., & Besson, V. C. (2024). "Pharmacotrophy": a playful tournament for game- and team-based learning in pharmacology education-assessing its impact on students' performance. *BMC Medical Education*, *24*(1), 219.

Dunaway, G. A. (2005). Developments: Adaption of team learning to an introductory graduate pharmacology course. *Teaching and Learning in Medicine*, *17*(1), 56-62.

Faccenda, E., Maxwell, S., & Szarek, J. L. (2019). The IUPHAR pharmacology education project. *Clinical Pharmacology and Therapeutics*, *105*(1), 45.

Fasinu, P. S., & Wilborn, T. W. (2024). Pharmacology education in the medical curriculum: Challenges and opportunities for improvement. *Pharmacology Research & Perspectives*, *12*(1), e1178.

Feng, S., & Shen, Y. (2023). ChatGPT and the future of medical education. *Academic medicine*, *98*(8), 867-868.

Fidalgo-Neto, A. A., Alberto, A. V. P., Bonavita, A. G. C., Bezerra, R. J. S., Berçot, F. F., Lopes, R. M., & Alves, L. A. (2014). PHARMAVIRTUA: educational software for teaching and learning basic pharmacology. *Advances in physiology education*, *38*(4), 368-371.

Fu, X., Wu, X., Liu, D., Zhang, C., Xie, H., Wang, Y., & Xiao, L. (2022). Practice and exploration of the" student-centered" multielement fusion teaching mode in human anatomy. *Surgical and Radiologic Anatomy*, *44*(1), 15-23.

Gudadappanavar, A. M., Benni, J. M., & Javali, S. B. (2021). Effectiveness of the game-based learning over traditional teaching–learning strategy to instruct pharmacology for Phase II medical students. *Journal of education and health promotion*, *10*(1), 91.

Guilding, C., Kelly-Laubscher, R., & White, P. (2024). The future of pharmacology education: a global outlook. In (Vol. 17, pp. 115-118): Taylor & Francis.

Guilding, C., Kelly-Laubscher, R., Netere, A., Babey, A. M., Restini, C., Cunningham, M., Kelly, J. P., Koenig, J., Karpa, K., & Hawes, M. (2023). Developing an international concept-based curriculum for pharmacology education: The promise of core concepts and concept inventories. *British Journal of Clinical Pharmacology*.

Hasamnis, A. A., Arya, A., & Patil, S. S. (2019). Case-based learning: our experience in clinical pharmacology teaching. *Journal of Pharmacy and BioAllied Sciences*, *11*(2), 187-189.

Kim, D.-H., Lee, J.-H., & Kim, S. A. (2020). The pharmacology course for preclinical students using team-based learning. *Korean journal of medical education*, *32*(1), 35.

Liu, L., Du, X., Zhang, Z., & Zhou, J. (2019). Effect of problem-based learning in pharmacology education: A meta-analysis. *Studies in educational evaluation*, *60*, 43-58.

Lockman, K., Haines, S. T., & McPherson, M. L. (2017). Improved learning outcomes after flipping a therapeutics module: results of a controlled trial. *Academic medicine*, *92*(12), 1786-1793.

MEIRA, M. B., MAIOLI, E. C., SOUZA, R. M., CAMARGO, M. S., & MISTRO, S. (2022). Case-based learning for teaching pharmacology to pharmacy students. *Revista Brasileira de Farmácia Hospitalar e Serviços de Saúde*, *13*(3), 775-775.

Michaelsen, L. K. (2004). Getting started with team-based learning. In *Team-based learning* (pp. 27-50). Routledge.

Morris, B. J., Croker, S., Zimmerman, C., Gill, D., & Romig, C. (2013). Gaming science: the "Gamification" of scientific thinking. *Frontiers in psychology*, *4*, 607.

Nguyen, T., Wong, E., & Pham, A. (2016). Incorporating team-based learning into a physician assistant clinical pharmacology course. *The Journal of Physician Assistant Education*, *27*(1), 28-31.

Özdener, F., Özbaykuş, A. C., Yavuz, M., Sürsal, A., Narter, F., & Koç, D. (2020). Case Based Learning Versus Conventional Lecture in Clinical Pharmacology Education and its Relation to Learning Styles. *Southern Clinics of Istanbul Eurasia*, *31*(3).

Patel, S. B., Lam, K., & Liebrenz, M. (2023). ChatGPT: friend or foe. *Lancet Digit Health*, *5*(3), e102.

Rivera, S. M., & Gilman, A. G. (2011). Drug invention and the pharmaceutical industry. *Goodman & Gilman's the pharmacological basis of therapeutics*, 3-16.

Sallam, M., Salim, N. A., Barakat, M., & Ala'a, B. (2023). ChatGPT applications in medical, dental, pharmacy, and public health education: A descriptive study highlighting the advantages and limitations. *Narra J*, *3*(1).

Sridharan, K., & Sequeira, R. P. (2024). Artificial intelligence and medical education: application in classroom instruction and student assessment using a pharmacology & therapeutics case study. *BMC Medical Education*, *24*(1), 431.

Sushama, J., Palappallil, D. S., & Thomas, S. P. (2022). Comparison of the effectiveness between problem-based learning and lecture class in pharmacology for medical undergraduates. *J Evid Based Med Healthc*, *9*(11), 48.

Tayem, Y. I. (2013). The impact of small group case-based learning on traditional pharmacology teaching. *Sultan Qaboos University Medical Journal*, *13*(1), 115.

Tushar, B. C., Gajanan, D., Gaurav, C., & Vishal, K. (2020). Student perception and effectiveness of case based learning in pharmacology.

van Gaalen, A. E., Brouwer, J., Schönrock-Adema, J., Bouwkamp-Timmer, T., Jaarsma, A. D. C., & Georgiadis, J. R. (2021). Gamification of health professions education: a systematic review. *Advances in Health Sciences Education*, *26*(2), 683-711.

Xiao, C.-L., Ren, H., Chen, H.-Q., Liu, W.-H., Luo, Z.-Y., Li, W.-R., & Luo, J.-Q. (2023). Multidimensional evaluation of teaching strategies for pharmacology based on a comprehensive analysis involving 21,269 students. *Frontiers in Pharmacology*, *14*, 1145456.

Zeng, H. L., Chen, D. X., Li, Q., & Wang, X. Y. (2020). Effects of seminar teaching method versus lecture-based learning in medical education: a meta-analysis of randomized controlled trials. *Medical teacher*, *42*(12), 1343-1349.

Zhang, X.-M., Yu, J.-Y., Yang, Y., Feng, C.-P., Lyu, J., & Xu, S.-L. (2019). A flipped classroom method based on a small private online course in physiology. *Advances in physiology education*, *43*(3), 345-349.