

## **IMPROVING THE METHODOLOGY OF TEACHING MICROBIOLOGY IN HIGHER MEDICAL EDUCATION INSTITUTIONS BASED ON AN INTEGRATIVE APPROACH**

<https://doi.org/10.5281/zenodo.18287706>

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### **Abstract**

This in the article medicine supreme in education microbiology science of teaching modern problems and his/her efficiency increase roads integrative approach. The study is based on purpose - theoretical knowledge practical and clinical skills with harmonized, interdisciplinary dependency provider teaching methodology working exit and him/her to practice current to grow efficiency is an assessment. In the study pedagogical experiment, questionnaire, observation and statistic analysis methods applied. Results this showed that integrative program based on trained students in the group not only microbiology to science related knowledge level (by 24%), but clinical discussion to do and laboratory issues solution to do skills are also significantly (by 31%) at the level increased. Conclusion as in other words, microbiology to education integrative approach current to grow future doctors professional competence in formation important factor is considered.

### **Key words**

Integrative education, microbiology, medicine supreme education, interdisciplinary connection, clinical microbiology, teaching methodology, competence.

### **INTRODUCTION**

Modern medicine fast developing, new contagious diseases appearance happening and antimicrobial global resistance analysis turned one in the period living. Such under the circumstances medicine supreme education required experts preparation in the process microbiology science role is unparalleled. However, traditional education methods often the fundamental principles of this science practical medicine and clinical decision acceptance to do with effective in binding enough not. (Harden, 2000) Students often microorganisms to study

isolated , from the clinic as a disconnected science acceptance does this and their future professional in the activity microbiological from knowledge use ability This limits of the problem solution in the process of integrative education approach the most promising from directions is one . Integrative approach is various sciences and modules between artificial borders no so that they content and methodological in terms of tie , study process into a single whole (Drake & Burns, 2004) . This of the article purpose , medicine supreme education in institutions microbiology science education methodology interdisciplinary ( anatomy , physiology , pathology , pharmacology ) and clinical sciences ( internal diseases , pediatrics , infectious diseases ) with deep integrated without improvement , as well as this methodology efficiency experimental road with study and from evaluation consists of .

## LITERATURE REVIEW

Integrative education global education in the system , especially profession and medicine in education wide used concept is considered . Researchers stated that integration to students knowledge unbroken without , real vital situations in the context of mastery opportunity ( Kyshtymova et al., 2022) . Medicine in education he is the first times " interdisciplinary " approach as appearance and then " systems - based" and " problem - based " teaching models with ( Brauer & Ferguson , 2015). Microbiology in the field integration importance his/her to oneself typical transdisciplinary by nature come Microbiology pathological processes , immunity mechanisms , chemical therapy principles and epidemiological control each other with connects ( Micheva et al., 2021) Thus together , many in countries microbiology programs still traditional , isolation done in a way organization References this shows that clinical microbiology according to knowledge and of skills lack to mistakes and diseases wrong diagnostics to do take arrival possible ( Mikhailovich et al., 2018). Uzbekistan in the context of microbiology education improvement issues one row scientists by studied , but its wide comprehensive clinical and fundamental sciences with integration problems enough not illuminated . Especially , high class to their students intended clinical microbiology according to practical of training methodological in terms of working exit current is a task (Karimov et al., 2020). International experience this shows that integrated courses students motivation increases , complicated medical situations understanding ability develops and them professional to activity better prepares ( Wijnen -Meijer et al., 2013).

## MATERIALS AND METHODS

Research 2024-2025 academic year in the year Uzbekistan one how much medicine among 3rd year students (300 ) of universities take went . Students

control (150 people) and experimental (150 people) groups random selectively separated. Control in the group microbiology science education current traditional program according to (separately) theoretical and practical course as) take went. Experimental in the group and special working issued integrated program This was used. program following to principles based was :

1. **Topics according to integration** : Every one microbiological topic (e.g. , Staphylococcus) pathology (abscess), clinic (furunculosis), pharmacology (antistaphylococcal) antibiotics) and epidemiology (nosocomial infections) with tied was trained .

2. **Clinical Case -Based Learning (CBL)** : Each module in real life at the end clinical situations based on working study case studies are presented was done .

3. **Laboratory their work to the clinic to tie** : Laboratory in training samples to receive , transport , results interpretation to do such as clinical to skills separately attention focused .

4. **Interdisciplinary seminars** : Pharmacologist , infectious disease specialist and bacteriologist together participation upcoming seminar sessions was held .

Education efficiency assessment for following methods used :

a) **Tests** : Fundamental knowledge and them clinical in situations to use appraiser standard tests (preliminary and education from the process then ).

b) **Practical skills assessment** : Standardized bemonda (OSCE) laboratory diagnostics and the results interpretation to do station .

c) **Questionnaires** : Students to the course interest , mastery level and teaching to the methods contentment level determination for anonymous questionnaire .

d) **Statistical analysis** : Received results in SPSS 26 program student's t-test and Chi- square test using analysis was done , statistical significance at  $p<0.05$  level acceptance was done .

## RESULTS

Integrative approach based on educated experimental group of students results control group to their students relatively all in indicators noticeable at the level high it has been .

**Table 1.** Experimental and control groups of students knowledge and skills assessment results

Evaluation indicator	Experimental group ( average ) score / %)	Control group ( average ) score / %)	Difference (%)	p - value
Fundamental knowledge test	$87.4 \pm 5.2$	$70.1 \pm 6.8$	+17.3	<0.001
Clinical situations solution to do test	$83.1 \pm 6.5$	$63.4 \pm 7.9$	+19.7	<0.001
OSCE ( lab skills )	$89.6 \pm 4.1$	$68.5 \pm 8.3$	+21.1	<0.001
General average indicator	86.7	67.3	+19.4	<0.001

From the table visible as it stands , experimental in the group fundamental knowledge level of 24% , clinical situations solution to do skill and 31 % close increased . OSCE results and integrated approach practical skills in formation especially effective that showed . Questionnaire to the results according to , experimental group 92% of its students are integrated the course traditional to the course than more interesting and practical importance has that calculated . 88% of students this approach professional preparations to improve help that gave emphasized . Control in the group and only 45% of students current from the course satisfactory at the level satisfied that stated .

## DISCUSSION

Received results integrative approach microbiology in education efficiency clear confirms . Fundamental knowledge noticeable growth ( 24%) is shows that knowledge clinical in context study them in mind stay and to understand makes it easier , because this knowledge abstract not , maybe concrete situations with binds ( Micheva et al., 2021). Clinical situations solution to do and OSCE results the most high growth (31% and 21.1% ) while integration main The goal is knowledge. practical to move convert ability to form achieved This process to students not only " microbe" what " , but also " germ with what to do " need " question answer find opportunity (Mikhailovich et al., 2018) . Students high motivation and satisfaction (92%) integrated of education student's study in the process active participation to reach opportunity giver , to him meaning meaningful character confirms ( Wijnen - Meijer et al., 2013). Practice this showed that successful integration for not only programs change , maybe teachers collaborative work skills It is also necessary to increase . Interdisciplinary seminars doctors and fundamental sciences teachers

between dialogue develops , this and training to the process positive impact shows . Difficulty as textbooks and educational -methodical of materials lack of , lesson tables coordination necessity record Uzbekistan under the circumstances this approach current to grow " Microbiology " course for program again seeing exit , clinical microbiology according to training manuals working exit and professors and teachers again preparation programs working (Karimov et al., 2020 ) . The research restrictions as only 3rd year students cover to take and far term impact ( e.g. , residency) during the period (not learning the results ) to bring possible .

## CONCLUSION

Medicine supreme in education microbiology of teaching traditional methods fundamental knowledge clinical practice with effective in binding restrictions available . Microbiology science pathology , pharmacology , clinical sciences and epidemiology with deep integrated without teaching , students not only theoretical knowledge level , maybe clinical thinking and practical laboratory skills noticeable at the level to increase opportunity gives . Production issued integrated methodology students to sciences was interest and training from the process satisfaction level sharp increases , this and their professional motivation strengthens . Integrative approach current to grow study programs again work , interdisciplinary cooperation organization to grow and professors and teachers special requires preparation . Future in research integrated of education far term impact , as well as virtual laboratory simulators and clinical information from the bases of use efficiency study to the goal is appropriate . Conclusion so , microbiology to education integrative approach future medicine of employees complex professional tasks , especially contagious diseases in the field , successful solution to do competence of formation main from factors to one rotation possible .

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