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A Stepwise Educational Framework for Practical Skill Acquisition in Undergraduate Dental Training

▷ **Aim.** This article presents the findings of an experimental study that focuses on reducing stress by cultivating practical knowledge and skills among students. Given that students are constantly exposed to chronic constructive stress [1, 2], traditional approaches to acquiring knowledge and practical competencies are often labor-intensive and inefficient. Low learning outcomes are frequently observed due to students' insufficient understanding of the tasks assigned to them. The experiment aimed to enhance the effectiveness of acquiring practical skills in therapeutic dentistry while taking into account students' psycho-emotional states.

Methods. Two groups of third-year students from different academic groups participated in the study. They were trained in patient examination techniques, specifically the local assessment of periodontal tissues and the condition of the oral vestibule. In the first group (30 students), a modified teaching approach was applied. The instructor clearly defined the objectives and clinical relevance of assessing the architecture of the oral vestibule, emphasized diseases associated with neglected anatomical abnormalities in this area, and provided a structured, step-by-step procedural outline. The demonstration was performed slowly using a training model, with a detailed explanation of the attachment level of the labial and buccal frenula and the depth of the oral vestibule. Special attention was paid to each component of the procedure, including the instruments used and their specific applications. Students then independently examined in accordance with the proposed scheme.

In the second group (32 students), a traditional teaching method was employed. The instructor explained the significance of the procedure and demonstrated it on a model using a periodontal probe; thereafter, the students performed the manipulation independently. The effectiveness of practical skill acquisition and the development of stable automated skills were compared between the two groups.

Results and Discussion. The results demonstrated that 28 students in the first group (93.3%) correctly performed the oral vestibular tissue examination on their first attempt. After ten identical repetitions of the procedure, all students in this group developed a stable automated skill. In contrast, in the second group, a stable automated skill was achieved in only 12 students (37.5%) after ten repetitions. It should be noted that the students in this group made numerous errors, including incorrect instrument selections, which required substantial time from the instructor for correction [3, 4].

Scientific Novelty. The experimental study was based on the theory of the step-by-step formation of mental actions and representations. The voluntary experiment conducted during the educational process among students of the Faculty of Dentistry at Ivano-Frankivsk National Medical University demonstrated high effectiveness in the acquisition of practical skills. The findings indicate that dental students require not only theoretical knowledge but also the development of practical skills through automation, without incurring additional stress.

Conclusions. The proposed methodology is an effective means of intentionally developing a set of manual skills in students. The use of structured action schemes for specific procedures simplifies the educational process and reduces the time required to create stable, automated practical skills.

Keywords: *educational process, practical skills, oral vestibular tissues, students*.

Statement of the problem

The educational process in higher medical institutions is aimed at training competent practicing dental professionals. Therefore, the development and refinement of practical skills and abilities, accompanied by their step-by-step analysis and consistent application in clinical practice, constitute a key responsibility of the instructor [3, 7]. Depending on the topic of a particular practical class, the teacher should adopt a comprehensive and flexible approach to its organization. Teaching methodology should function as a means of information exchange between the instructor and students (verbal, visual, and practical), a tool for managing students' cognitive activity (direct, indirect, and self-directed), a form of pedagogical interaction (frontal, group-based, and individual), a mechanism for stimulating motivation to study the discipline and fostering deontological values, and a method for monitoring the effectiveness of the educational process.

Within the credit-based modular system, students are required to independently master a substantial volume of theoretical material, necessitating a high level of adaptability to assimilate extensive theoretical and practical knowledge. This process largely depends on the students' individual psychological capacities. During their university education, students are exposed to various forms of stress, including psychological, emotional, and informational. Informational stress is considered the most detrimental, as it arises from both information overload and insufficient information. In addition, contemporary dental education emphasizes close interaction with real patients rather than exclusive reliance on simulators, placing students under professional stress [1, 2]. This condition is characterized by emotional tension triggered by unexpected and demanding clinical situations against the background of intellectual and emotional overload.

Accordingly, the instructor plays a crucial role in facilitating the development of stable practical skills required for future professional practice, thereby helping prevent chronic emotional strain and burnout. Analysis of the existing student training system indicates that insufficient learning outcomes are frequently observed. In our opinion, this situation results primarily from inadequate consideration of students' psycho-emotional states and the absence of a pedagogically grounded methodology that enables the gradual development of individual technical procedures to the level of automated performance.

Aim of the study: to enhance the effectiveness of practical skill acquisition among dental students under conditions of sustained psycho-emotional load.

Research Methods

Our experiment was based on the theory of stepwise formation of "mental actions and representations" [5]. Research has demonstrated that the formation of mental actions leads to the emergence of thought, which is a dual construct: the comprehension of the action's content and the reflection on it as a mental operation, i.e., its essence. The second component of the action is internal attention, which develops through control over the action's objective content. It is emphasized that thought and attention are distinct phenomena. Thought is present in every human action and consists of three components: orientational, executive, and control. When an action becomes mental and transforms into "understanding," the executive component functions as the automatic processing of the objective content of the action in consciousness.

In contrast, the control component represents the subject's reflection on the action, integrating personal activity, internal attention, and consciousness into a single experience. Accordingly, any action comprises three elements: orientational, executive, and control. The orientational component ensures conscious execution, accuracy, and quality of the action; the executive component corresponds to the actual performance of the action (e.g., taking an instrument and performing a specific procedure); the control component ensures self-monitoring and correction of the action.

Within the framework of our experiment, we developed a detailed protocol for a practical manipulation: the examination of the oral vestibular tissues, including assessment of vestibular depth and the height of the labial and buccal frenula. Emphasis on this topic is justified because alterations in the architecture of the oral vestibule may lead to localized periodontitis, gingival recession, and anterior tooth protrusion and may impede protocol-based treatment of patients with dentofacial anomalies without prior correction of these architectural disturbances.

We identified the key elements of the procedure:

- the objective of the action,
- the materials and their characteristics,
- the instruments required,
- the plan and sequence of steps to achieve the objective,
- the elements of control to ensure correct execution.

A critical aspect of constructing the action scheme was the use of illustrative explanations for each stage of the procedure (instrument selection by number or by marking the examination area, key procedural

steps, and control points). Even under conditions of constant psycho-emotional stress and a large volume of theoretical material, students equipped with a clear procedural scheme were able to perform the manipulation correctly on the first attempt.

The second essential aspect of our experiment was the organization of conditions for the formation of practical actions and for ensuring their execution at the required quality level. At the beginning of the practical session, the instructor explained the scheme and demonstrated each step slowly; thereafter, students independently practiced the procedure on a head model, following the scheme. Students were allowed to use the scheme until they had entirely memorized the sequence of actions and could perform the manipulation independently. This approach reduces stress among students and ensures the stable development of practical skills, ultimately transforming learned actions into automated skills, provided there is no psychological pressure from the instructor.

Statistical Analysis and Data Presentation

Descriptive statistics were presented in terms of absolute numbers and percentages. To compare proportions between groups, R (version 4.0) was used: https://www.R-project.org. Graphical representations were also created in R to illustrate the distribution of the data.

Treatment Methods

Two groups of third-year dental students from different academic cohorts were formed to study patient examination techniques, specifically the local assessment of periodontal tissues and the oral vestibule. In the first group (30 students), the instructor clearly explained the objective and clinical significance of examining the vestibular architecture, as well as the potential pathologies that can arise from neglecting anatomical irregularities in this area [8]. A detailed procedural scheme was provided. The instructor slowly demonstrated the examination on a head model, highlighting the height of labial and buccal frenula attachment and the depth of the vestibule, drawing attention to each element of the procedure, including the instrument used and its specific application. Students were then asked to perform the examination independently, following the provided scheme.

In the second group (32 students), a traditional teaching method was employed. The instructor first explained the significance of the manipulation and then demonstrated it slowly on a model using a periodontal probe. Students subsequently performed the procedure independently.

The accuracy of practical skill performance was assessed, and the number of students who could conduct the diagnostic procedure without errors was recorded. Additionally, the degree to which the manipulation had been mastered to the point of automation was evaluated.

Results and Discussion

The study results showed that 28 students in the first group (93.3%) correctly performed the oral vestibular tissue examination on their first attempt. After completing ten identical manipulations, all students in this group developed a stable, automated skill. In contrast, in the second group, only 12 students (37.5%) achieved a stable automated skill after ten repetitions of the procedure. It is noteworthy that task performance in the second group was accompanied by numerous errors, particularly incorrect instrument selection for diagnosing vestibular architectural abnormalities, which required substantial time for the instructor to correct. Additionally, students in the second group exhibited a high level of psycho-emotional stress. Comparative analysis indicated that the experimental teaching methodology enables students to acquire practical skills without errors, with skill automation achieved after completing ten identical manipulations. Despite ongoing interaction between students and patients, the acquisition of practical skills requires considerable effort from both instructors and students [3, 5, 7, 10]. During practical sessions, students experience informational stress, which, from a psychological perspective, is characterized by a specific form of perception of an extreme situation and a corresponding behavioral model in response to this perception [1, 2]. Research indicates that stress caused by physical exertion is less detrimental than stress arising from failure, self-doubt, or cognitive overload [6].

The results of our experimental study, grounded in the theory of stepwise formation of "mental actions and representations," demonstrate that this approach facilitates a structured and effective progression through the learning process for both students and instructors. These findings are consistent with the conclusions of other researchers [4, 5]. We consider it essential that dental students acquire not only theoretical knowledge but also develop practical skills in automation while minimizing the risk of additional stress-related conditions.

Conclusions

1. The developed methodology for acquiring practical skills is an effective tool for the targeted formation of automated actions in students, grounded in solid theoretical knowledge [5, 7]. This approach

allows students to gradually transition from the conscious execution of tasks to their automation, ensuring consistent, high-quality performance of professional procedures in future clinical practice.

2. The creation of detailed schemes for each practical skill simplifies the learning process, enhances knowledge retention, and reduces the time required to achieve a high level of professional competence [8].

3. Stepwise acquisition of practical skills helps prevent informational stress, reduces psycho-emotional load, and mitigates the risk of student burnout [2, 6].

4. Additionally, the proposed methodology promotes the systematic development of both cognitive and manual skills, allows for effective monitoring of task accuracy, and enables instructors to efficiently assess students' practical competencies [1, 3, 9].

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Покрокова освітня модель формування практичних навичок у підготовці студентів-стоматологів

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Мета. У статті подано результати експериментального дослідження, спрямованого на зниження рівня стресового навантаження шляхом цілеспрямованого формування практичних знань і навичок у студентів. Враховуючи, що студенти постійно перебувають у стані хронічного конструктивного стресу [1, 2], традиційні підходи до засвоєння знань і практичних умінь часто є надмірно трудомісткими та малоефективними. Однією з причин цього є недостатнє розуміння студентами поставлених навчальних завдань, що зумовлює низький рівень засвоєння матеріалу. Метою експерименту було підвищення ефективності опанування практичних навичок з терапевтичної стоматології з урахуванням психоемоційного стану студентів.

Методи. У дослідженні взяли участь дві групи студентів III курсу з різних академічних груп, які вивчали методику клінічного огляду пацієнта, зокрема локальний огляд тканин пародонту та стану присінка рота. У першій групі (30 осіб) навчання здійснювалося за модифікованою методикою: викладач чітко формулював мету та клінічну доцільність оцінки архітектоніки присінка рота, акцентував увагу на патологічних станах, що виникають унаслідок ігнорування анатомічних порушень цієї ділянки, та пропонував

структуровану схему виконання маніпуляції. Демонстрація проводилася повільно на навчальному муляжі з детальним поясненням висоти прикріплення губних і щічних вуздечок, а також глибини присінка рота, із чітким зазначенням інструментів та ділянок їх застосування. Після цього студенти самостійно виконували огляд, керуючись запропонованою схемою.

У другій групі (32 особи) застосовувався традиційний підхід до навчання огляду тканин присінка рота з використанням пародонтального зонда. Викладач пояснював значення маніпуляції та демонстрував її на муляжі, після чого студенти виконували завдання самостійно. Оцінювали ефективність засвоєння практичних навичок та формування стійкого автоматизованого вміння.

Результати та обговорення. Результати дослідження засвідчили, що 28 студентів першої групи (93,3%) з першої спроби коректно виконали огляд тканин присінка рота. Після виконання десяти ідентичних маніпуляцій у всіх студентів цієї групи сформувалася стійка автоматизована навичка. Натомість у другій групі після десяти повторень маніпуляції стійка автоматизована навичка була сформована лише у 12 студентів (37,5%). Слід зазначити, що виконання завдань у цій групі супроводжувалося значною кількістю помилок, зокрема неправильним вибором інструментів, що потребувало суттєвих часових витрат з боку викладача на їх корекцію [3, 4].

Наукова новизна. Експериментальне дослідження ґрунтується на теорії поетапного формування розумових дій і уявлень [5]. Проведений добровільний експеримент у процесі навчання студентів стоматологічного факультету Івано-Франківського національного медичного університету продемонстрував високу ефективність запропонованого підходу у формуванні практичних навичок. Отримані результати свідчать про необхідність поєднання теоретичної підготовки з формуванням автоматизованих практичних умінь у майбутніх лікарів без посилення стресового навантаження [6, 7].

Висновки. Запропонована методика є ефективним засобом цілеспрямованого формування комплексу мануальних дій у студентів. Використання чітко структурованих схем виконання конкретних маніпуляцій сприяє оптимізації навчального процесу та скороченню часу, необхідного для формування стійких автоматизованих практичних навичок.

Ключові слова: *навчальний процес, практичні навички, тканини присінка рота, студенти.*

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