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STATISTICAL ANALYSIS OF EXPERIMENTAL WORK AIMED AT DEVELOPING STUDENTS' DIAGNOSTIC COMPETENCE BASED ON THE DD (DIAGNOSTIC DIVERGENCE) MODEL

Valiyeva Nodiraxon Maxamatjonovna
Andijan State Medical Institute

Abstract: This study presents a comprehensive statistical analysis of experimental work focused on enhancing medical students' diagnostic competence through the Diagnostic Divergence (DD) model. Using a quasi-experimental design, students were divided into control and experimental groups. Quantitative methods, including descriptive statistics, t-tests, ANOVA, and correlation analysis, were applied to evaluate the impact of the DD model on clinical reasoning, error detection, and decision-making accuracy.

Keywords: Diagnostic competence, Diagnostic Divergence (DD) model, statistical analysis, clinical reasoning, medical education, experimental study, reflective practice, interdisciplinary learning, error analysis, decision-making.

INTRODUCTION

In the field of medical education, the development of robust diagnostic competence is a key determinant of a future physician's professional readiness. A persistent challenge is that traditional teaching methods often prioritize the acquisition of theoretical knowledge over the development of analytical and practical skills, which can limit a student's ability to apply their knowledge in real clinical settings. To address this gap, the DD (Diagnostic Divergence) model was introduced, which integrates problem-based learning, reflective analysis, and strategies for differential diagnosis. This study presents a comprehensive statistical analysis of experimental work that was conducted to evaluate the effectiveness of the DD model in the context of teaching infectious diseases. The model emphasizes the identification of multiple diagnostic pathways and the use of clinical reasoning supported by interdisciplinary knowledge.

METHODS

The study utilized a structured pedagogical framework to assess the impact of the DD model on students' diagnostic competence.

Study Design: A quasi-experimental design was employed, with students divided into experimental and control groups. The experimental work involved initial and final control assessments to measure changes in competence levels.

Participants: A total of 465 students from three medical universities participated in the experimental work: Fergana Medical Institute of Public Health, Andijan State Medical Institute, and Bukhara State Medical Institute.

Intervention: The experimental group received instruction based on the DD model, which incorporates an interdisciplinary approach , simulation technologies, case studies, and virtual laboratories. The control group was taught using conventional methods.

Assessment and Data Collection: To assess students' diagnostic competencies, criteria were developed based on three key areas: motivational, cognitive, and activity-based. Student performance was categorized into high, medium, and low levels of achievement for each criterion.

Statistical Analysis: A range of quantitative methods were used to evaluate the impact of the DD model, including descriptive statistics, t-tests, ANOVA, and correlation analysis.

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RESULTS

The statistical analysis revealed significant differences in the development of diagnostic competence between the experimental and control groups following the intervention.

Baseline assessment - At the preliminary justification stage of the research, the initial results showed that the experimental and control groups had very similar levels of achievement across all three assessment criteria.

Motivational Criterion: High achievement was 7.7% in the experimental group and 7.4% in the control group ; low achievement was 71.5% and 70.9%, respectively.

Cognitive Criterion: High achievement was 6.8% (experimental) and 7.4% (control) ; low achievement was 71.5% and 71.7%, respectively.

Activity-based Criterion: High achievement was 7.2% (experimental) and 7.8% (control) ; low achievement was 72.8% and 72.6%, respectively.

Post-intervention assessment - The final results demonstrated a marked improvement in the experimental group compared to the control group.

Motivational Criterion: The high achievement level in the experimental group reached 19.1%, which was 9.6% higher than the control group's 9.6%. The low achievement level in the experimental group decreased to 25.1%, a 40.5% reduction compared to the control group's 65.7%.

Cognitive Criterion: The high achievement level in the experimental group was 18.7%, a 9.6% difference compared to the control group's 9.1%. The low level in the experimental group fell to 26.8%, a 39.7% reduction compared to the control group's 66.5%.

Activity-based Criterion: The high achievement level in the experimental group reached 20.4%, a 10.9% difference compared to the control group's 9.6%. The low level in the experimental group was reduced to 26.4%, a 38.4% reduction compared to the control group's 64.8%.

Effectiveness ratios and statistical significance - The effectiveness of the interdisciplinary approach was calculated based on these results: The motivational criterion's effectiveness increased by 1.15 times (15%). The cognitive criterion's effectiveness increased by 1.14 times (14%). The activity-based criterion's effectiveness increased by 1.14 times (14%). The experimental group's superior performance was supported by high statistical significance ($p < 0.05$). Furthermore, correlation analysis demonstrated strong relationships between the use of DD-based learning strategies and the development of clinical reasoning skills.

DISCUSSION

The statistical analysis of the experimental study provides robust evidence confirming both the theoretical significance and practical effectiveness of the DD model. The findings clearly indicate that the DD model significantly improves students' diagnostic competence, leading to enhanced diagnostic accuracy, a reduction in errors, and better reflective judgment. The significant outperformance of the experimental group over the control group can be attributed to the model's core components, which emphasize interdisciplinary integration, active problem-solving, and the use of advanced learning tools like simulation and case studies.

These results underscore the value of implementing the DD model within medical curricula, particularly in complex subjects like infectious diseases, to better prepare future physicians for the ambiguities and challenges of real-world diagnostics. Moreover, this study suggests that the integration of rigorous statistical monitoring into pedagogical research is essential for providing evidence-based validation of innovative teaching methodologies, thereby driving continuous improvement in medical education.

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