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Research Protocol

Education Section

Use of Mnemonics as Teaching and Learning Adjuvant for Ayurveda Undergraduate Students: A Research Protocol

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ABSTRACT

Introduction: Teaching and learning techniques like mnemonics are beneficial for enhancing recall memory. Mnemonics serve as memory tools, aiding individuals in remembering substantial amounts of information, especially when dealing with names and lists, such as traits, procedures, phases, components, etc. Educational institutions often introduce these techniques to help students learn and retain information, thereby facilitating the process of absorbing large amounts of information about Ayurvedic compendia. Therefore, it is imperative for teachers to strategically plan and incorporate these methods into the Ayurveda education system to enhance students' academic performance in examinations.

Need of the study: Mnemonics prove invaluable for learners in Ayurveda education programmes who grapple with memorising extensive and unfamiliar content that differs from the pre-existing knowledge in Ayurveda compendia. To enhance cognitive development in students, it is crucial to employ adjuvant teaching and learning techniques like mnemonics. This approach facilitates students in memorising significant content from texts related to subjects in Ayurveda education.

Aim: To evaluate the role of mnemonics as a teaching and learning supplement to improve the academic performance of undergraduate Ayurveda students.

Materials and Methods: This parallel group interventional crossover study will be conducted by the Samhita and Siddhanta department for first-year BAMS students at Mahatma Gandhi Ayurved College in Maharashtra, India, from November 2023 to December 2024. Eighty-four first-year BAMS students will be randomly divided based on odd and even roll numbers into two groups, namely A and B. Participants will be subjected to pre- and post-tests formulated on topics 1 and 2 by providing brief answer questionnaires. The parameters for evaluation will include pretests and post-tests using the traditional teaching and learning method alongside the mnemonic teaching and learning method as its supplement. Crossover intervention and feedback analysis will be conducted using a 5-point Likert scale. Data will be obtained by evaluating the mean differences between pre- and postintervention scores in an Excel spreadsheet. These scores will be utilised to evaluate the learning gains achieved by both approaches in terms of parameters assessed as absolute, relative and class average normalisation. Statistically, t-tests will be employed to analyse the collected data. A p-value <0.01 suggests strong evidence against the null hypothesis and indicates statistical significance.

Keywords: Education, Memory, Methods, Recitation, Teaching materials

INTRODUCTION

Education embodies the knowledge amassed by individuals through studying specific subjects or the assimilation of life lessons that contribute to a deeper understanding. Learning is complex, encompassing intricate mental activities like critical thinking and problem-solving abilities. The objective for those involved in learning methodologies is to furnish developers with the most effective tools, facilitating comprehensive understanding, knowledge and relevant skills for their careers. In education, technology is not just the latest revolution; rather, the era is transitioning towards more distributed contexts with diverse educational motivations [1].

To enhance the teaching and learning process, educators employ various teaching methods, reflecting on their instructional practices to analyse how a subject was taught and considering ways to improve or modify the approach for better learning outcomes [2]. Adopting creative teaching techniques is a potent tool for social change and transformation. The societal challenges we face primarily stem from issues within educational institutions, making innovation essential as it imparts new skills and fosters novel insights and approaches to tackle the nation's social problems.

Empowering students to confront the global challenges of the 21st century is imperative. According to the Oxford Dictionary, innovation is defined as "the introduction of novelties, the alteration of established methods," which aligns with the aim of this article. The education standard, especially in teaching and learning, is an essential performance metric for every educational establishment [3].

Mnemonics are memory aids that assist students in recalling significant information, particularly when they are used in lists that include attributes, phases, stages, components and similar information. Mnemonics dramatically increase recall, according to a 1967 study by Miller GR, who also found that students who regularly used these tools experienced score increases of up to 77% [4].

Various types of mnemonics are available, and the imaginative capacity of each learner solely limits the most effective type. This handout introduces nine fundamental types of mnemonics and nine key categories: music, name, note organisation, image, connection, spelling mnemonics, expression, word and model [5].

Employing innovative teaching and learning techniques such as mnemonics is essential for enhancing recall memory, a practice often imparted in educational institutions to assist students in learning and remembering information. Therefore, our teachers must plan and adeptly incorporate these techniques into our Ayurveda education system, aiming to improve students' academic performance in examinations [6].

This approach to learning traces its roots back to ancient Greek times. Mnemonic devices serve as memory enhancers whenever information is transferred from short-term to long-term memory [7].

Learners can use different types of mnemonic devices to increase the retention of information.

1. The Method of Loci (MOL) involves visualisations. Activate the MOL by envisioning yourself moving through a familiar space. This mnemonic, based on images, can assist in remembering routes, locations and lists. For example, self-prepared mnemonics using the keyword method, following the 3R framework, were employed to teach the topic of Marma and the types of Marma to students of BAMS [8].
2. Chunking, a type of organisational mnemonic, entails breaking down information into smaller parts and learning them separately before combining them. This method is advantageous for recalling phone numbers and grocery lists. Chunking exceeds the usual short-term memory limit of seven pieces of information, which can be used to memorise the content of Ayurveda compendiums [7].
3. Acronyms and acrostics, sometimes called name mnemonics, are composed of the first letter of each word or line to produce a meaningful phrase or statement. For example, SOAP stands for Subjective, Objective, Assessment and Plan [9].
4. Rhyming mnemonics, which utilise acoustic encoding and auditory stimuli, aid in the recall of information. An example of a rhyming mnemonic is the leap year poem, "Thirty Days Hath September" [7].
5. Musical mnemonics rely on auditory stimuli and represent another technique. Converting information into music proves to be a valuable approach for enhancing retention. For example, the "ABC song" uses the melody of "Twinkle, Twinkle, Little Star" to assist in memorising the alphabet [7].

The aim of the study is to evaluate and compare the effectiveness of mnemonics as a teaching-learning method for improving the academic performance of first-year undergraduate Ayurveda students (BAMS).

The primary objectives of the study are to assess the academic performance of first-year undergraduate BAMS students by traditional teaching-learning methods based on Ayurveda compendiums and to assess their academic performance using mnemonic teaching methods from the same compendiums.

The secondary objective of the study will be to compare the effectiveness of traditional teaching-learning methods with mnemonic teaching methods based on Ayurveda compendiums.

Null hypothesis: Compared to traditional teaching and learning methods, mnemonics may not improve the academic performance of undergraduate Ayurveda learners.

Alternative hypothesis: Compared to traditional teaching and learning methods, mnemonics will improve the academic performance of undergraduate Ayurveda learners.

REVIEW OF LITERATURE

Mnemonics help create memories in students' minds and label these images in a strong, natural storage system. This process of learning is an active and complex interface involving the recalling of terminologies and the constructing of concepts [10]. For students pursuing careers in medical fields, knowledge of technical and medical terminology is a prerequisite for enabling them to solve problems in their respective disciplines and professions. More recently, mnemonics have proven to be a valuable tool for assisting both regular and special education students in committing ideas and vocabulary to memory [10,11]. There has only been one study conducted for Ayurveda learners. Ayurveda is a field endowed with Sanskrit terminology, consisting of verses from Ayurvedic compendiums. Sometimes, this leads to a lack of confidence among students, raising the significant question of how to learn all of this material within a specified timeframe. Therefore, the study was planned to simplify this arduous task with the help of mnemonics and to improve students' recall capacity. For conducting this study, 60 first-year BAMS students were enrolled randomly. Lectures were arranged consecutively using the traditional method and with the help of mnemonics for 10 days each. After the teaching sessions, feedback forms and Multiple-Choice Questions (MCQ) tests were evaluated. It was concluded that mnemonics significantly enhanced learning, with a significance level of p-value <0.0001 [8]. Due to their effectiveness in transforming non meaningful, non sensical and abstract information into concrete, meaningful knowledge, mnemonics are effective tools, which have even been proven successful among school students [12]. The best retention of knowledge can be achieved by using mnemonics, which help encode memory and aid in retaining learned information [13].

MATERIALS AND METHODS

This parallel group interventional crossover study will be conducted by the Samhita and Siddhant department for first-year BAMS students at Mahatma Gandhi Ayurved College, situated in the state of Maharashtra, India, from November 2023 to December 2024. The study will be conducted after obtaining consent from the students. Institutional Ethical Clearance (IEC) was obtained before the study, with reference number DMIHER (DU)/IEC/2023/532, dated 03/02/2023.

Inclusion criteria: Students of first-year BAMS at MGACH&RC, Salod (H), Wardha, who are willing to participate, will be included in the study.

Exclusion criteria: Students who are unwilling to participate or who do not complete all steps of the study will be excluded from the study.

Sample size calculation: The estimated sample size for this study was calculated using Noether's Formula [14]:

$$n = \frac{(Z_{\frac{\alpha}{2}} + Z_{\beta})^2}{3\left(p - \frac{1}{2}\right)^2}$$

n=number of subjects per sample,

for $\propto$=0.05

Zα/2=1.96 and for 80% power (β=0.20),

Zβ=0.084

(p-0.5)=effect size

p=0.25 (Change in score condition for present study

$n=\frac{(1.96+0.84)^2}{3\ (0.25-0.50)^2}=7.84/0.1875=41.81$

n=42 approx. per group

Total Sample size calculated (n)=84

Study Procedure

All 84 students in the intervention group will be divided into two groups based on odd and even roll numbers, namely Group A and Group B, each consisting of 42 participants. The principal investigator, a professor in the Department of Samhita and Siddhanta, has formulated a brief answer questionnaire covering two topics: 1) the names of 50 Mahakashaya and 2) the names of drugs in 5 Mahakashaya. This questionnaire will be validated by a subject expert from the School of Health Education and Research (SHER) at Datta Meghe Institute of Higher Education and Research (DU) before being administered to the students. These two topics were chosen as they are included in the syllabus for the first-year Samhita Adhayan 1 subject, which contains a significant amount of information. Students find it challenging to study the verses in the Sanskrit language and recall their contents; therefore, these topics were selected to facilitate the learning process. The reliability of the questionnaire will be evaluated. Pretests and post-tests will be conducted using traditional teaching methods and separate pretests and post-tests will be administered using supplementary mnemonic teaching methods in two distinct classrooms. For Topic 1, the names of 50 Mahakashaya Shlokas, as recited in Charaka Samhita Sutrasthana Chapter 4, will be assigned for memorising

by traditional teaching-learning methods to Group A (students with odd roll numbers). Group B (students with even roll numbers) will be provided with acronyms and acrostics mnemonics on the same topic. A pretest will be conducted in the classroom. Following the pretest, the content of the topic will be taught in separate classrooms by an assistant professor in each classroom for 30 minutes, allowing students two hours for study. A post-test will then be administered to students in both groups to assess their ability to recall the names of 50 Mahakashaya using both traditional and mnemonic methods.

Another topic, Topic 2—Names of drugs in 5 Mahakashaya Shlokas as per Charaka Samhita Sutrasthana Chapter 4—will be selected for teaching and learning. This will be assigned for memorisation using the crossover group method, and a pretest will be conducted in the form of a brief answer questionnaire. Group A (students with odd roll numbers) will be provided with mnemonics, while Group B (students with even roll numbers) will be instructed to memorise the Shlokas through recitation for Topic 2. After the pretest, all students will be separated into two groups: A and B. The topic will be taught to both groups by two assistant professors from the Department of Samhita and Siddhanta in separate classrooms for 30 minutes. Following this, the students will be given two hours to study the content. The post-test for Topic 2 will be conducted to assess their ability to recall the names of Dravyas individually in relation to the five Mahakashaya using both methods. Two different postgraduate scholars will act as observers, sitting in separate classrooms to monitor the entire classroom activity. The intervention will be designed so that all students are exposed to both teaching methods from both groups. Students' perceptions of the teaching and learning methods will be gathered in the classroom through a prepared feedback questionnaire. Feedback plays a crucial role in the learning process, helping learners to understand their strengths, identify areas for improvement and refine their abilities and skills. It fosters independence and critical thinking, promotes motivation, supports self-reflection, enhances learning retention, and guides progress.

Students' responses to the provided feedback questionnaire will be analysed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), and a consensus score will be computed. The data collected regarding students' perceptions of traditional and mnemonic teaching-learning methods and their effectiveness will also be analysed.

Outcomes

Average learning gain scores will be obtained by using the following formulas to calculate the average learning gain for traditional and mnemonic teaching-learning methods:

I) Data analysis completion index (% of completely solved clues)

II) Absolute learning gain={(% post-test score)-(% pretest score)}

III) Relative learning gain={(% post-test score)-(% pretest score)}/(% pretest score)×100

IV) Class average normalised gain (g)={(% post-test score)-(% pretest score)}/100-(% pretest score) [15].

STATISTICAL ANALYSIS

Data will be entered into a Microsoft Excel spreadsheet, and statistical analysis will be performed using Statistical Package for the Social Sciences (SPSS) version 17.0 software. A t-test will be applied to evaluate the mean differences between the pre- and postintervention scores for both groups. Qualitative and quantitative analyses will be conducted using the data obtained from the student feedback forms. Observations will be assessed based on set parameters, such as the data analysis completion index, absolute learning gain, relative learning gain and class average normalisation, to evaluate and compare learning gain using the specified formulae [15].

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