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Students' perception regarding pedagogy, andragogy, and heutagogy as teaching–learning methods in undergraduate medical education

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Abstract:

INTRODUCTION: Medical education is tricky to imbibe and difficult to apply. Various teaching–learning (TL) methods have been tried from time to time to enhance the proficiency of students. The aim was to assess the students' perception toward three different TL methods (pedagogy, andragogy, and heutagogy) in medical education.

MATERIALS AND METHODS: A comparative experimental questionnaire-based study was done on population of second-year MBBS students of SMS Medical College, Jaipur, in October 2019. They were taught topic of anticancer drugs using pedagogy, andragogy, and heutagogy methods. Then, their opinion regarding these methods was collected and evaluated. The reliability of the questionnaire was ascertained by Cronbach's alpha value which turned out to be 0.89. The data collected were analyzed statistically using one-way Analysis of Variance (ANOVA) and Principal Component Analysis (PCA).

RESULTS: The results showed that all these methods differ significantly from each other as the $P < 0.05$ considering 5% as level of significance. PCA revealed that andragogy and heutagogy were found to be most effective in this study.

CONCLUSION: Competency-based andragogy and capability-based heutagogy are more effective TL methods than didactic lecture-based pedagogy for MBBS undergraduate students.

Keywords:

Medical education, pedagogy, self-directed learning

Introduction

Medical education has always been a challenging task as every patient is unique and dynamic. Learners here have to learn and perform in open, heterogeneous, dynamic, and uncertain environments.^[1] Furthermore, the students at this stage are adults who have to study various multidisciplinary and interdependent subjects. Out of the bombardment of knowledge to them, it is very tricky to remember the imperative and still more difficult to apply them. Various

TL methods have been tried from time to time to enhance the expertise in medicine.

Pedagogy is an oldest teacher centric form of learning where teacher decides what and how to teach and assess the learning.^[2] In conventional terms, it is basically a lecture-based classroom TL method with its main focus on imparting knowledge without emphasizing its application. Subsequently, it was realized that after adolescence, students are mature enough to put forth their views and wish their participation and also to decide the curriculum and methods of learning. It

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paved the way for andragogy (adult learning), term given by Knowles in 1970.^[3] Key features of andragogy are autonomous, self-directed, interactive learning, and learners are more motivated by internal than external drives. Students in andragogy are more interested in immediate implementation of knowledge gained and hence prefer problem-centric approach and expect respect and equal status.^[3,4]

Abela *et al.* 2009 have also described five main classes of learning – instrumental, self-directed, experiential, perspective transformation, and situated cognition. Andragogy is one of the popular theories of adult learning under self-directed learning.^[5]

Heutagogy is a concept originally given by Hase and Kenyon at the turn of century and was revived by Blasche in 2012.^[6,7] Nowadays, in this era of digital technology, it is favored to acquire, renew, and upgrade knowledge and skills for long-term learning. Heutagogy is a student-centric self-determined learning based on humanistic theory guided by technology-based learning design. It lays distinct emphasis on learners to decide what to learn, and how to learn and on learning to create opportunities.^[7,8] For this, several “C” have been proposed like the curious learners cognize the problem and explore the knowledge and means to solve them using their own ways depending on their learning abilities. Finally, they connect, communicate, collaborate, and share their experience mostly using digital media (computers) that is why heutagogy has been called a “net-centric” theory and is a combination of experiential as well as transformative type according to Abela *et al.*^[5,7,9,10] It will help to make them creative, confident, and capable in addition to competent for the workplace. Heutagogy makes the students lifelong learners and the role of educator is limited to teach them “how to teach themselves.”^[11] Another main differential factor of heutagogy from other two approaches is the idea of “double-loop learning.” Single-loop learning is used when the current goals, values, and strategies are sound, not questionable, and the emphasis is on techniques and their effectiveness. On the other hand, double-loop learning is used when strategy is reviewed and the emphasis is on learning and reviewing previous situations. Hence, double-loop learning allows learners to put together their own beliefs before trusting the theories in use and then reflect on the problem, and this is actually how the science grows.^[12] Important differences between pedagogy, andragogy, and heutagogy are summarized in [Table 1].

As the students are the targets whatever be the methods used, this study was designed in an endeavor to get the perception of students regarding the different TL methods in terms of suitability as professionals,

generating interest, and usefulness to understand the topic and subject.

Aim

The aim of the study was to study the perception of students regarding the pedagogy, andragogy, and heutagogy as TL methods in medical education at undergraduate level.

Materials and Methods

Research method

This was a comparative experimental study.

Population and sampling

The population of this study included all second-year MBBS students of SMS Medical college, Jaipur. Simple random sampling was used to select the participants. The inclusion criteria were being second-year MBBS student and students who gave consent for the study. The exclusion criteria students had not given consent to take part in the study and other than second-year MBBS students.

Research hypotheses

Null hypothesis (H_0) = Mean response of all the four methods are same, i.e., all the teaching learning TL methods do not differ significantly.

Research tool

Prevalidated questionnaire was validated by interdepartmental faculty of SMS Medical College and its reliability was checked by calculating Cronbach's alpha which was found to be good (0.89) for the study.

Ethical clearance

Prior ethical approval was obtained (No. 2683 MC/EC/2016 dated 30/9/16) from the institution.

Methodology

The present study is a questionnaire-based research where the perception of the second MBBS students was recorded for different instructional techniques used in learning at undergraduate level. These are classroom lecture-based pedagogy, problem-based self-directed andragogy, and keyboard technology-based heutagogy. After obtaining the required consent from second-year MBBS students, they were taught topic of anticancer drugs with these methods. Topic of anticancer drugs was selected as it is important, extensive, and thorny. A part of it was taught by didactic lecture-based pedagogy. For the second part, students were given a problem and were asked for self-directed learning. The role of teacher here was as a guide and facilitator where instead of discussing in detail they were briefed about the topic to be covered and resources available.

Table 1: Important differences between pedagogy, andragogy and heutagogy

Features	Pedagogy	Andragogy (self directed)	Heutagogy (self determined)
Target learners	Children or naïve students with no experience	Adults with or without experience	Adults with some exposure
Objective of learning	Gain knowledge to go to next stage	Develop competency needed to solve the problem	Develop capability based on need and potential to learn
Role of teacher in learning and assessment	Learners are totally dependent and teachers decide what, how, when about leaning and assessment (teacher centric)	Learners are autonomous and teachers act as guide and facilitator to help adults to become self directed learners (problem centric)	Independent learners with limited role of educators who foster curiosity and bring opportunities (learner centric)
Motivational factors	External reward driven	Internal need and desire driven	Internal enquiry driven
Resources of learning	Limited, advised and/or devised by teachers	Controlled; collaboratively decided by educator and learner	Unlimited, may be provided by teacher but decided mainly by learner
Learning to change underlying values and assumptions	No (single loop)	No (single loop)	Yes (double loop)
Allows creativity	No	No	Yes
Requires interlearner collaboration, connectivity for learning	No	Not essential	Must
Process of learning	Unidirectional	Bidirectional	Multidirectional
Level of cognition/learning	Cognitive	Meta-cognitive	Epistemic (evidence based)

As component of heutagogy part, students were asked to find, observe, and interact with the cancer patients when they go into the ward or community and also read and share texts and videos of the patients’ and students’ experience in a class group formed on mobile phones. We choose these three methods as pedagogy is practiced widely, andragogy is adopted in competency-based medical education, and heutagogy owing to the fact that hospitals, community, and digital platform are going to be their future workplace and learning from there will keep them conscious of the ground reality of problem, presentation, and facilities available.

Instrument

To collect the data regarding students’ perception about pedagogy, andragogy, and heutagogy, a questionnaire was developed as no validated questionnaire could be found on Internet. The developed questionnaire was validated interdepartmentally and had 12 question items [Table 2].

The reliability of the questionnaire was determined using Cronbach’s alpha coefficient. It turned out to be 0.89 which was good enough to go with the questionnaire. The students were required to select the most appropriate choice from the pedagogy, andragogy, and heutagogy and all methods are equal in their opinion. The questionnaire was shared through the Google Forms to the students. A total of 132 students took the questionnaire.

Data analysis

To analyze the data, we used Minitab 14 software (Pennsylvania, United States) and using this statistical software first, we evaluated the descriptive statistics such as frequency, percentage, mean, median, standard

Table 2: Questionnaire used in the study

Question	P	A	H	E
Directions-Mark the most suitable answer in your opinion regarding different methods of education				
1. Most important for learning at your age 19-22 years				
2. Most brain storming method				
3. Easiest among the three				
4. You think will cause longest retention of knowledge/skill/ability				
5. Method you will prefer the most for learning				
6. Which method is most interesting				
7. Which method is most helpful in identifying areas of high importance				
8. Which method gives you a sense of participation in designing learning?				
9. Which method according to you requires maximum concentration?				
10. Role of teacher is most important in				
11. Which method do you find most practice oriented				
12. Which methods do you find most self confidence inculcating				

P=Pedagogy, A=Andragogy, H=Heutagogy, E=Equal

deviation, coefficient of variation, and third quartile for all four options (variables). Analytical test including Anderson–Darling normality test was done to indicate that populations had a normal distribution. One-way analysis of variance (ANOVA) and principal component analysis (PCA) were then done.

Results

Descriptive statistics of four options are given in [Figure 1].

The descriptive study showed that the mean, standard deviation, and coefficient of variation are highest for

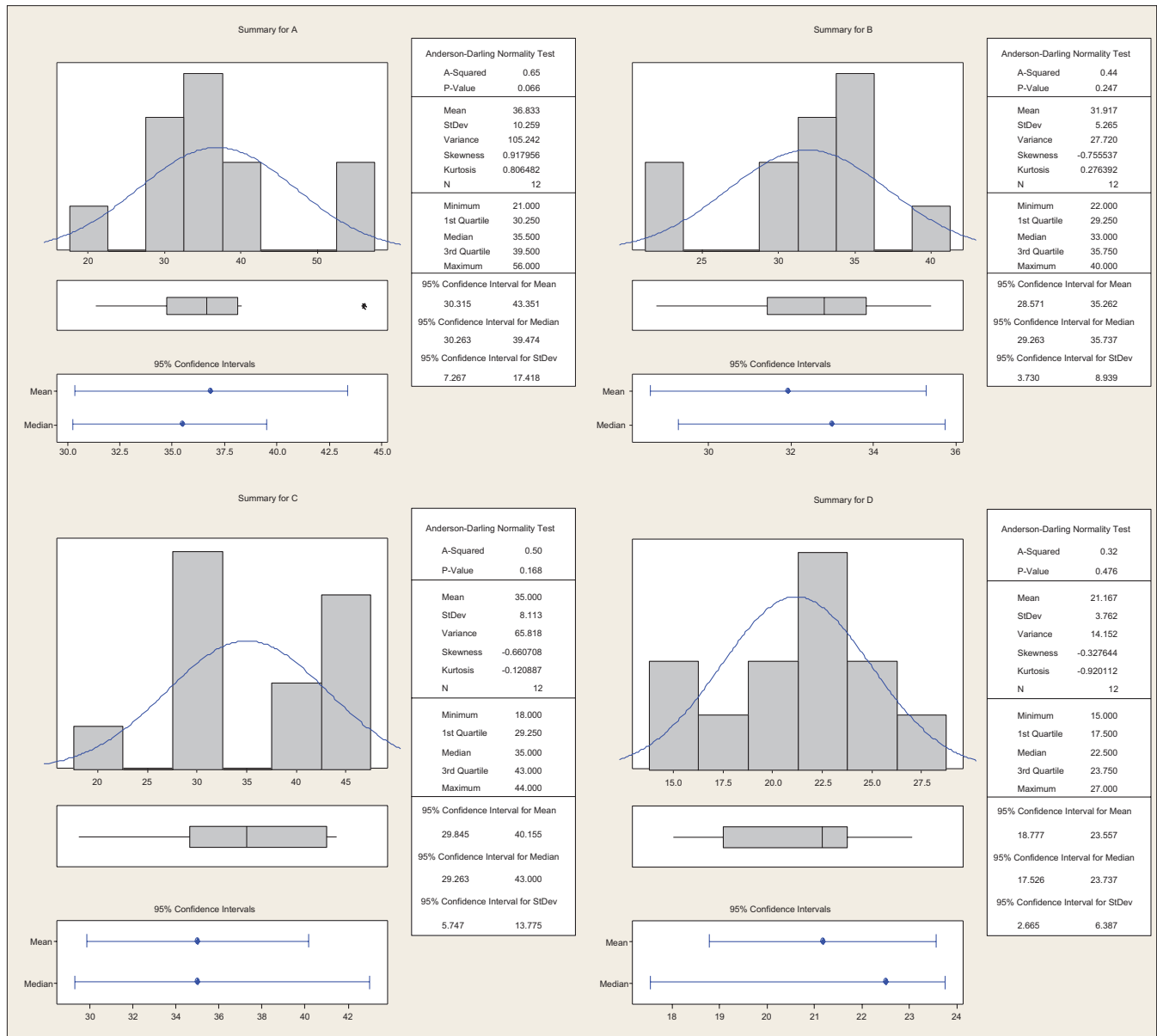


Figure 1: Descriptive statistics of all the four options (A, B, C, and D) in graphical form

the variable A. This concludes that option “A” is highly variate in all the questions.

Hypothesis (H_0): We assumed that the mean response for all the four methods are the same, i.e., all the four TL methods do not differ significantly. For testing the above hypothesis, we used one-way ANOVA.

In One Way ANOVA table, the source of variations are Factor, Error and Total. For these three sources of variation, the degrees of freedom (df) are 3, 44 and 47 respectively. Sum of squares (SS) for Factor, Error and Total are 1768.2, 2342.3 and 4110.5, respectively. The mean sum of squares (MS) for factor is 589.4 and for Error is 53.2. The F value and P value for the factor are 11.07 and 0.00 respectively as shown below:

One-way ANOVA A, B, C, D.

Source DF SS MS F P.

Factor 3 1768.2 589.4 11.07 0.000.

Error 44 2342.3 53.2.

Total 47 4110.5.

Since $P < 0.05$ (5% level of significance), we reject the null hypothesis and conclude that the mean responses are different and all the four TL methods differ significantly.

To analyze the effectiveness of each variable, we performed PCA as depicted in Table 3.

Table 3: Principal Component Analysis of variables: A (Pedagogy), B (Andragogy), C (Heutagogy), D (Equal)

Eigen analysis of the Correlation Matrix				
Eigen value	1.967	1.089	0.939	0.003
Proportion	0.49	0.272	0.235	0.001
Cumulative	0.492	0.764	0.999	1.000
Variable	PC1	PC2	PC3	PC4
A (Pedagogy)	-0.711	0.065	-0.005	-0.700
B (Andragogy)	0.280	-0.830	0.316	-0.364
C (Heutagogy)	0.586	0.248	-0.522	-0.568
D (Equal)	0.270	0.495	0.792	-0.234

As shown in [Table 3], in PCA of options A, B, C, and D, the first principal component has variance (eigenvalue) 1.9677 and accounts for 49.2% of the total variance. The second principal component has variance 1.0896 and accounts for 27.2% of the data variability. Hence by PCA, we conclude that factor B (andragogy) and C (heutagogy) are most effective in this study.

Individual responses to various questions are summarized in [Figure 2].

Discussion

Our study reports that students found heutagogy as most brain storming, practice oriented, and it made the learners more confident about their capability in comparison to other two. When learners are competent, they demonstrate the acquisition of knowledge and skills; skills can be repeated and knowledge retrieved. When learners are capable, skills and knowledge can be reproduced in unfamiliar and changing situation by their creativity. Capability is thus the continuum of one’s own competence as capability alone is not possible without competency. Many educators in the professional fields also found heutagogy to be a plausible response to the critical issues that their learners come across in the actual workplace and have designed their learning environments accordingly to harp the maximum benefits.^[13-15] For example, Bhojruv *et al.* (2010) established that for nursing students, heutagogy is offered as an emerging and potentially highly congruent educational framework placed around practice-based learning.^[13] We could not find similar study regarding the evaluation of pedagogy, andragogy, and heutagogy using students’ perception despite extensive search; hence, we cannot compare with other studies. However, Wenger has emphasized the importance and influence of “Communities of Practice” to guide and encourage the learners to work together as a team with available resources to gain the required competencies.^[16] Similarly, Greenhill *et al.* uphold that using clinical immersion models of clerkship rotations in hospital and community helps learners to gain insights in the areas of patient centeredness, systems thinking, clinical skepticism, and understanding diversity.^[17] Kolb’s

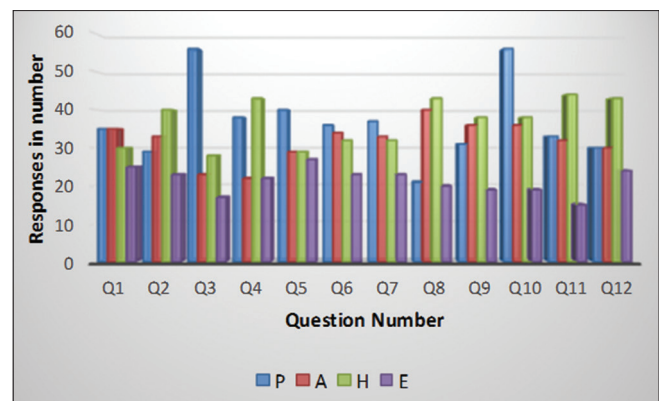


Figure 2: Individual responses given by students to questionnaire

experiential learning theory helps educators to create learning experiences in the professional curriculum and facilitate learning through discovery and critical thinking when possible. For this, the educators make the learners plan for and later reflect on the learning experience so that they are better prepared for the next time they are faced with the same problem or professional task, thereby improving the efficiency to perform.^[18] Heutagogy method used in our study had combined the above three by experiencing through exposure in ward postings as well as in the community around them and then sharing and discussing their related views and experience through technology. The results of our study are in full accordance with these studies. In 2010, the UNESCO also recommended the following teaching strategies for the 21st century: experiential learning, storytelling, values education, inquiry learning, appropriate assessment, future problem solving, outside classroom learning, and community problem solving.^[19]

Pedagogy is educator centric method of teaching where teacher decides the curriculum, methods of learning, and assessment. It does not give students any sense of participation in their own learning. Andragogy is patient centric where instructors establish objectives and curriculum based on learner input and guide students along the learner path, while the responsibility for learning lies with the learner. Heutagogy is technology-based learner centric as they become aware of their favored learning style and can easily adapt new learning situations to their learning styles. For it, they become more creative thus making them lifelong learners with longest retention and it is reflected in their approach toward the problem. Our study also confirmed that heutagogy and andragogy allowed them to choose their own method of innate learning giving them feeling of maximum participation in their own learning and making the learning more effective and longer lasting. Moreover, extensive learning resources such as connectivity and collaboration in heutagogy also contribute to better learning. The same views are expressed in the previously

published studies.^[20,21] In fact Wheeler 2011 in his study went as far as to say, “New technologies have also created a need for considering new pedagogical approaches, with andragogy, seemingly “outmoded in the light of recent rapid development in new teaching methods, learning resources, and digital media.”^[21] A project entitled “Digital learning now!” in the United States in December 2010 also stressed that “Digital learning has the potential to be a catalyst for transformational change in education.” It allows students to learn in their own way at their own pace, and maximize their chances for success in school and beyond.”^[1,22]

Students in our study found pedagogy to be the most easiest method to identify and stress on important topics with the help of teachers Still they found heutagogy followed by andragogy as the most effective method when directed to adult learners. These self-motivated and self-determined professional learners improve productivity by ensuring their participation and personalization, the “three Ps.”^[23,24] A similar study which compared the pedagogy and andragogy learning orientation preferences reported that an integrated approach should be considered in classroom learning as well as in designing and developing an online learning application among undergraduate learners.^[25]

Limitations

This study has been performed on only second-year MBBS students of one medical college only, so the results cannot be generalized to all learners across all disciplines.

Future implications

This study is first of its kind. This study could become the basis for comparison of different teaching learning methods for future studies. More of such multicentric studies involving large population are warranted.

Conclusion

Pedagogy makes the learners conscious about the knowledge and skill required. Andragogy makes them competent to use skill in trained conditions, but heutagogy makes them capable to work in all circumstances using their creative, cognitive, communicative, collaborative, and digital skills. The study concluded that andragogy and heutagogy are more effective TL methods at the undergraduate level to produce the erudite, competent as well as capable professionals.

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Conflicts of interest

There are no conflicts of interest.

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