

Effectiveness of Storytelling Method: An Example Lecture with Medicine Students on Brachial Plexus Anatomy

Eficacia del Método de Narración: Ejemplo de una Clase con Estudiantes de Medicina Sobre la Anatomía del Plexo Braquial

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SUMMARY: Stories are an education tool and teaching strategy, which makes lectures more memorable. This study aimed to determine the efficiency of the storytelling technique on an example anatomy lecture for terminal branches of brachial plexus. The class (n=90 students) was divided into two groups as Group 1 (n=47 storytelling group) and Group 2 (n=43 direct instruction group). Three stories related to terminal branches of brachial plexus were told to Group 1 in advance. Group 2 were lectured with the same subject by the instructor by using the theoretical direct instruction method as usual. Both groups underwent an examination including 20 questions after the instructions. Moreover, the feedback of the storytelling group (Group 1) was evaluated using an agreement scale. The mean age was 19.85±0.96 years. The results of the achievement test showed a significant difference between the groups. The storytelling group is higher than the results of the direct instruction group (p<0.05). More than 85 % of the students strongly or completely agree that storytelling is a good teaching method, helpful to explain the anatomy topics, helpful for understanding the subject, listening to the lesson described by storytelling technique is more effective than reading the book and this method accelerates the anatomy learning process. It can be said that the students in the storytelling group were satisfied with the anatomy lecture in many aspects. Our study suggests that storytelling could be a supplementary method in anatomy education.

KEY WORDS: Anatomy; Brachial plexus; Education; Medical faculty.

INTRODUCTION

In medical faculties, anatomy lessons, which lay the foundation for clinical practice, are often learned using basic strategies due to the Latin terminology and complex content (Ward, 2011; Bahsi *et al.*, 2021). It is reported that the knowledge learned with basic learning strategies is more likely to be easily forgotten (Custers, 2010). Numerous methods for promoting permanent learning in anatomy instruction have been researched, including augmented reality, social media tools, mobile learning, team-based learning, computer-assisted learning, virtual reality, comics, clinical cases, problem-based learning, interactive methods, and educational games (Tam *et al.*, 2009; Kim *et al.*, 2017; Duarte *et al.*, 2020; Erbek & Bolatlı, 2020; Bölek *et al.*, 2021; de Lima *et al.*, 2021; Ortadeveci & Ozden, 2023). Storytelling has long been used across various fields and educational levels. It helps interpret knowledge, evaluate

findings, form and present opinions, and fosters enjoyable, lasting learning by increasing the learner's interest in the subject (Seren & Yakıncı, 2015). The reason to prefer storytelling is supposed to be that it creates an active, engaging, and entertaining learning atmosphere (Singh *et al.*, 2019). The storytelling method is also said to enhance academic success by promoting permanent learning, supporting reflective and active engagement, fostering deeper learning, boosting motivation, encouraging creativity, and cultivating positive attitudes (Saritepeci, 2021). However, it is not common to apply this method in higher education, and the studies on medicine faculty students are also rare (Kieser *et al.*, 2008; Urstad *et al.*, 2018; Singh *et al.*, 2019; Zijlstra-Shaw & Jowett, 2020; Colak *et al.*, 2021). This study aimed to identify methods that facilitate anatomy learning, specifically evaluating the effectiveness of the

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storytelling method for medical students in comparison to traditional direct instruction. Furthermore, it was hypothesized that using storytelling could enhance students' ability to connect anatomical concepts with clinical practice, offering a more engaging and memorable learning experience that extends beyond rote memorization.

MATERIAL AND METHOD

This cross-sectional and descriptive study was conducted between September and November 2023. All participants were informed about the study, which was approved by the Local Ethical Committee of Hitit University (Decision no: 27.09.2023/2023-13) and followed the principles of the Declaration of Helsinki. Voluntary second-term medical students from Hitit University participated in the study, while those who failed the previous term were excluded. The students were motivated by the opportunity to contribute to improving anatomy teaching methods.

After selecting the subjects on the terminal branches of the brachial plexus from the fall semester curriculum, participants were randomly divided into two groups by drawing lots: Group 1 (storytelling group) and Group 2 (direct instruction group). Group 1 was taught through three stories related to the terminal branches of the brachial plexus (median nerve, radial nerve, ulnar nerve). The stories, created by anatomists and an experienced curriculum researcher, focused on the passage location, neighborhoods, and functions of the brachial plexus branches. Group 2 was taught through traditional direct instruction by a lecturer with twelve years of experience. Both groups took a 20-question achievement test, and their results were compared. Additionally, Group 1 completed a 12-item Likert-type agreement scale developed by Colak *et al.* (2021), to assess their views on the storytelling method. The scale, designed

to collect medical students' views on the storytelling method in anatomy education, was not standardized and included two reverse items (Q8 and Q12). The storytelling agreement scale is provided in Table I. Statistical analysis was performed using SPSS (Version 25.0, Armonk, NY, USA), with data examined in terms of frequency and percentage. The Student's t-test was used to compare group data after assessing normality with the Shapiro-Wilk test. A P-value < 0.05 was considered statistically significant.

Story 1: Median nerve anatomy. Once upon a time, a thrilling story began in the magnificent planet of nerve cells in Stimulus Town. This story is based on the anatomy of median nerve exploration. The parents of the median nerve are quite heroic nerves. Father of median nerve is the medial root of median nerve branching from medial cord and mother of median nerve is the lateral root of median nerve branching from lateral cord. The responsibility of the median nerve is to support strength and feeling to our hands by going through both arms. It begins the exploration by going through the curved inner side of the arm. The median nerve comes across a comrade named brachial artery while going ahead the river named bicipital groove. The nerve goes ahead of the body and soul without a backward glance. It has to go ahead carefully between the heads of the dragon with two heads named as pronator teres muscle while moving on the front face of the forearm and there is a dangerous risk of being stuck in this area. The median nerve comes across the muscles which make hands flex while going ahead the front face of the forearm and spends some time getting acquainted with each of them. It does not come over the flexor carpi ulnaris muscles and the medial part of flexor digitorum profundus muscle in the forearm area. Now, it is time for the houses in the hand area. It comes across some tunnels, alleys and rivers during the travel and enters the carpal tunnel by passing through below a protective band named flexor retinaculum.

Tabla I. Appendix: Storytelling agreement scalee.

Q1	Storytelling is a good teaching method
Q2	Storytelling is helpful to explain the anatomy topics
Q3	Storytelling technique is helpful for understanding the subject
Q4	Storytelling technique helps to listen until the end of the lesson
Q5	Storytelling technique attracts my interest and helps me to gather attention more easily
Q6	Listening to the lesson described by storytelling technique is more effective than reading the book
Q7	Storytelling technique can be more effective if it is supported by visual items
Q8*	Telling lessons by the classical theoretical method is more effective than storytelling technique
Q9	Storytelling technique accelerates the anatomy learning process
Q10	Storytelling technique gives me a new perspective on how to study
Q11	Storytelling technique supports by classical theoretical method
Q12*	Storytelling technique decreases the value of the lesson

* Reverse item

However, it has to be very careful during this progression, otherwise it may be stuck in this tunnel and hurt itself. It arrives at the hand region during the exploration at the end. While the median nerve going ahead the houses in the village of thenar, it stares out at the I. and II. lumbrical muscles, and it goes straight there. Now, it goes ahead the distal of the area while approaching the end of journey. It nearly explores the whole journey and decides to spend some time on the distal of the area. The nerve finishes the adventure by brightening the skin sensation of the palmar side of the hand corresponding to the thumb, index finger, middle finger and the lateral half of the ring finger on the palmar side of the hand, except for a small area lateral to the thenar region, and the skin sensation of the distal phalanx of the thumb, index finger, middle finger and the lateral half of the ring finger on the dorsal side.

Story 2: Radial nerve anatomy. Once upon a time, there was a story told about a fighter nerve named as radial nerve. Radial nerve exists as long, thin, and strong nerve fiber and a terminal ramus emerging from C5-T1 fibers of the posterior cord family. It begins from the shoulder, goes from the back of the arm towards the downside and extends to the back of the hand. One day, it decides to embark on a big adventure in the human body. The first destination is the shoulder area. It reaches the back of the arm from the shoulder area. It follows a valley named as the groove for radial nerve. There is a closest friend of it named deep brachial artery. It makes the muscles named as triceps brachii muscle and anconeus muscle move by giving them energy in the backward of the arm. The next destination is the elbow area. It opens out the curtain named as lateral intermuscular septum of arm and goes through it. It branches into superficial and deep branches in the forearm in order to travel more actively. Superficial branch goes forward to the lateral side of the front surface of the forearm with its friend named radial artery and reaches the dorsal surface of the hand. Here, it brightens the lateral dorsal surface of the hand and dorsal surface of fingers (1, 2, and 3. fingers). Moreover, the superficial branch brightens a small area in the lateral of thenar region on the palmar surface. Deep branch wants to give energy to the muscles of the hand and fingers while operating the extensor muscle groups in the backward of the forearm region. It becomes a legend of the nerve town with this challenging journey. The people of the town always remember the journey story of this fighter nerve.

Story 3: Ulnar nerve anatomy. Ulnar nerve is a nerve to take on an essential task and was born in a small town of the human body. The town is located on the foothills of the valley named as medial cord in the city of axillary fossa. The duty of the nerve is to give strength and feeling to our hands. It goes to the arm area with the best friends as brachial artery and median nerve in order to fulfill this duty and goes through the foothills of mount biceps brachii muscle

in the arm area. Suddenly, it comes across an obstacle wall named medial intermuscular septum of arm. It has to drill the wall in order to continue the way and fulfill the duty. The nerve reaches a path named groove for the ulnar nerve prepared diligently in advance for it after filling the wall. It has to go through a narrow canal named the cubital tunnel located between the two heads of flexor carpi ulnaris muscle in order to be able to reach the forearm area through the favorite path. The ulnar nerve may be stuck in this canal if it is not careful enough. It looks up the map and realizes that it arrives at the desired area. The nerve visits two big mansions named flexor carpi ulnaris muscle and flexor digitorum profundus muscle (medial part) needing energy for the forearm. The next targets are the houses needing energy for the hand area. It goes through a narrow canal named as Guyon canal in order to arrive at the hand area and reach the hand valley. The ulnar nerve branches into two, as a superficial branch and deep branch in the hand area. There are tiny houses and settlements, and the ulnar nerve wants to visit all of them. The nerve visits the houses in the hypothenar village of hand valley. There are neighbors of these houses, and it does not ignore visiting them. Palmar interossei are the neighborhood houses. It comes across new places during the journey and continues the adventure with great excitement. It comes across houses in a row named lumbricales muscles. It wants to visit only the III and IV houses. Finally, it arrived at the village of thenar and ignored the adductor pollicis muscle and flexor pollicis brevis muscle (deep head) here. However, the ulnar nerve feels that its energy is low near the end of the adventurous journey. Therefore, the inner side of the palmar and dorsal surfaces of the hand area and fourth and fifth fingers of palmar and dorsal surfaces are brightened.

RESULTS

The mean age of the participants was 19.85 ± 0.96 years old ($n=47$ storytelling group, $n=43$ direct instruction group, female: 55, male: 35). The characteristics of the participants are presented in Table II.

Table II. Characteristics of the groups.

	Group 1 (ST) $n=47$	Group 2 (DI) $n=43$
Age (years)	19.74 ± 0.96	19.97 ± 0.96
Sex (F/M)	32/15	23/20

ST: Storytelling, DI: Direct instruction, F: Female, M: Male.

There was a difference between the groups in terms of mean achievement test points of the results of the 20-question achievement test. The results of the storytelling group were higher than the results of the direct instruction group ($P < 0.05$) as shown in Table III. The distribution of the agreement scale score percentages is described below in

Table III. Comparison of the exam results of groups.

	Mean±SD	t	p
Group 1 (ST)	64.46±15.81	5.934	0.001
Group 2 (DI)	43.60±17.53		

$p < 0.05$ is statistically significant, Independent samples t test, ST: Storytelling, DI: Direct instruction, SD: standard deviation.

Table IV. Cronbach's Alpha in the present study was excellent ($\alpha = 0.929$). More than 85 % of the students strongly or completely agree that storytelling is a good teaching method, helpful to explain the anatomy topics and understand the subject. Listening to the lesson described by storytelling is more effective than reading the book and this method accelerates the anatomy learning process (Q1, Q2, Q3, Q6 and Q9). Also, more than 85 % of them disagreed or slightly disagreed that storytelling technique decreases the value of the lesson (Q12). Individuals over 80 % thought that storytelling technique helps to listen until the end of the lesson and attracts their interest and gathers attention more easily (Q4 and Q5). Furthermore, more than 90 % of the students think that storytelling technique can be more effective if it is supported by visual items (Q7). They also found the storytelling technique as a new perspective on how to study, and they thought that was supported by the direct instruction method (Q10 and Q11). More than 70 % of the participants found the lessons more effective by the storytelling technique than the direct instruction method (Q8).

In addition, the mean attitude score of the applied scale was calculated as 4.28 for 12 items. According to this attitude score, it was seen that the students showed positive attitudes towards teaching the anatomy course with the storytelling method. In addition, the storytelling group students were asked to rank the methods they used while studying anatomy (theoretical) according to their preferences. According to this ranking, students preferred course notes (given by instructors) in first place with 63.8 %. The anatomy atlas (printed version) comes in second place with 53.2 %. Interactive anatomy atlases (digital version) are in last place with a rate of 40.4 %.

DISCUSSION

Anatomy is a crucial course in medicine, requiring engaging and memorable teaching methods. This study aims to evaluate the effectiveness of storytelling in enhancing understanding and retention of anatomy content. The results indicate that the storytelling group scored higher on the achievement test than the direct instruction group, suggesting that this method improves student performance.

Storytelling activities in various disciplines, similar to the findings of this study, demonstrate positive educational outcomes. Research involving nursing students has identified three key benefits of student-produced digital storytelling: enhanced engagement, reflective ownership, and deeper understanding (Urstad *et al.*, 2018). The difference in achievement test results between the storytelling and direct instruction groups in this study aligns with the finding of deeper understanding in previous research. This deeper understanding refers to gaining a new perspective on the subject, allowing students to engage in various inductive learning settings. Participants in our study experienced a unique learning method, distinct from traditional classroom presentations. The engaging series of stories related to anatomy may have encouraged them to approach the subject from a different perspective, leading to a deeper understanding, which was reflected in their achievement test performance.

Mokhtar *et al.* (2011), stated that improvement of imagination is affected by the use of storytelling or listening to a contextualized story related to the present situation. Therefore, students can use their imagination power to solve problems in their daily life. High imagination skills help students create novel and authentic opinions. Moreover, self-confidence and motivation are promoted in favor of the students to be capable and proficient in order to reach their goals. One finding of our study is the participants' high agreement with the use of storytelling in anatomy lessons.

Table IV. Evaluation of storytelling agreement scale questionnaire for learning anatomy.

	Disagree (%)	Slightly agree (%)	Moderately agree (%)	Strongly agree (%)	Completely agree (%)
Q1	2.1	2.1	8.5	36.2	51.1
Q2	0	2.1	10.6	31.9	55.3
Q3	0	8.5	6.4	21.3	63.8
Q4	0	4.3	14.9	27.7	53.2
Q5	4.3	6.4	6.4	23.4	59.6
Q6	2.1	6.4	4.3	23.4	63.8
Q7	0	0	4.3	12.8	83
Q8	42.6	27.7	12.8	6.4	10.6
Q9	0	6.4	4.3	31.9	57.4
Q10	6.4	6.4	12.8	31.9	42.6
Q11	6.4	2.1	19.1	40.4	31.9
Q12	63.8	25.5	4.3	2.1	4.3

In this context, storytelling may stimulate students' imagination, allowing them to learn the subject in a more meaningful and coherent way.

Colak *et al.* (2021) harmonized the direct instruction method with storytelling technique in anatomy lessons and explored the positive effect of storytelling on the grades of the students. What is more, they asserted the importance of contextual storytelling in terms of meaningful and consistent learning. The credibility of storytelling regarding the agreement of students is quite high that helps them understand the subject and focus on the lesson. The current investigation has many similar findings and perspectives with the research above-mentioned. The significant difference of achievement test found between the storytelling and direct instruction groups supported by the study findings of Colak *et al.* (2021), as well as the agreement questionnaire. The similar directions of the two researches reinforces the success of the storytelling method in terms of the instruction of anatomy lesson.

In a study of clinical dental anatomy education with storytelling, it is reported that the students were highly satisfied with the method. The researchers of the paper asserted that the storytelling had a positive effect on clinical dental anatomy instruction in a problem based learning setting, and they suggested this method to integrate into the dental education curriculum. Another study on dental students enhanced the understanding of the role of storytelling in the education and development of dental students (Zijlstra-Shaw & Jowett, 2020). Moreover, Sandars *et al.* (2008), stated that storytelling appears to offer a useful approach to promote deeper learning by medical students and it has a great potential to motivate students. In addition, storytelling was found effective and the study suggests that storytelling may be used as a means to convey complex scientific information (Csikar & Stefaniak, 2018). It seems that the storytelling could be a combining teaching technique which completes each other with direct instruction. Furthermore, it is known that the usage of storytelling affects cognitive characteristics positively and provides more persistent learning (Saritepeci, 2021). The listener of the story pictures and almost experiences the story in one's mind during the cognitive process after the storytelling session. Therefore, this cognitive process activates the brain and helps it release dopamine. It is supposed that dopamine release helps to remember the memory of stored one easily therefore the information can be remembered naturally, and the permanence of the knowledge supports students to get high marks (Colak *et al.*, 2021). The hypothesis of the more permanent of knowledge in one's mind with storytelling by activating the brain the higher performance of the students in examinations was indicated in the previous research.

Hence, the exam performance result of the storytelling group in our study supports the hypothesis above-mentioned. Consequently, one of the reasons for the satisfaction of the storytelling group students in our study could be that the storytelling method is prepared by the instructors and presented by the instructor based on the instructor's performance in a way to keep the student in the story.

Our study was planned to determine the agreement level of the storytelling method on medicine faculty students by a unique and quantitative aspect and the effectiveness of this method compared to direct instruction for anatomy education. The most important limitation of our study is that the method was applied to a certain number of students in a single-center. Future studies conducted in different universities and different departments may provide more comprehensive information in terms of students' achievement and satisfaction levels of the anatomy course with the storytelling method. Writing and presenting stories about the subject in a way to attract students' attention is more demanding and time-consuming than the direct instruction method. Another limitation of the study is that the storytelling method includes certain branches of the brachial plexus. However, the median nerve, radial nerve and ulnar nerve are the three most important nerves of the brachial plexus that provide sensory innervation and movement of the upper limb.

In conclusion, storytelling is an effective method for increasing interest, achievement, and satisfaction in anatomy education for medical students. It can be recommended as a supportive tool, especially for understanding complex anatomical structures like cranial nerves, brachial plexus, and lumbosacral plexus, which have significant clinical importance, such as entrapment neuropathy.

AKCAALAN, M.; TURHAN, B.; GOLPINAR, M.; AKCAALAN, M.; ARI, H. S. & COMERT, A. Eficacia del método de narración: Ejemplo de una clase con estudiantes de medicina sobre la anatomía del plexo braquial. *Int. J. Morphol.*, 43(4):1202-1207, 2025.

RESUMEN: Las historias son una herramienta educativa y una estrategia de enseñanza que facilita la memorización de las clases. Este estudio tuvo como objetivo determinar la eficacia de la técnica de narración en un ejemplo de clase de anatomía para las ramas terminales del plexo braquial. La clase (n=90 estudiantes) se dividió en dos grupos: Grupo 1 (n=47 grupo de narración) y Grupo 2 (n=43 grupo de instrucción directa). Se contaron con antelación al Grupo 1 tres historias relacionadas con las ramas terminales del plexo braquial. El Grupo 2 como de costumbre, recibió la misma clase impartida por el instructor, utilizando el método teórico de instrucción directa. Ambos grupos se sometieron a un examen de 20 preguntas tras las instrucciones. Además, la retroalimentación del grupo de narración (Grupo 1) se evaluó mediante una escala de acuerdo. La edad media fue de $19,85 \pm 0,96$ años. Los resultados de la prueba de

rendimiento mostraron una diferencia significativa entre los grupos. El grupo de narración obtuvo mejores resultados que el grupo de instrucción directa ($p < 0,05$). Más del 85 % de los estudiantes estuvieron total o totalmente de acuerdo en que la narración es un buen método de enseñanza, útil para explicar los temas de anatomía y para comprender la materia. Escuchar la lección descrita mediante la técnica de narración es más efectivo que leer el libro y este método acelera el proceso de aprendizaje de la anatomía. Se puede afirmar que los estudiantes del grupo de narración estuvieron satisfechos con la clase de anatomía en muchos aspectos. Nuestro estudio sugiere que la narración podría ser un método complementario en la enseñanza de la anatomía.

PALABRAS CLAVE: Anatomía; Plexo braquial; Educación; Facultad de Medicina.

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