

EFFECT OF LEARNING ANATOMY & PHYSIOLOGY THROUGH STORY TELLING ON GIBB'S REFLECTIVE SCORES OF UNDERGRADUATE NURSING STUDENTS

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Abstract

Traditional instructional models centered on PowerPoint presentations and static whiteboard lectures frequently create passive learning environment that can constraint independent critical thinking and dampen creative problem solving. In the complex and abstract subject of Anatomy and Physiology, innovative pedagogical approaches that increase engagement along with conceptual understanding are needed. Recently, storytelling has become an effective teaching method that helps to simplify complex concepts into stories that enhance understanding and retention. The main purpose to conduct this study was to evaluate students' satisfaction on using storytelling as a teaching pedagogy in the delivery of technical concepts. 150 students from BSN-I (ZUFONAM) participated in a systematic and scripted lecture on the integumentary system, after informed consent. In this lecture pedagogy of storytelling was used in an innovative way to explain the concepts. For Analysis a sample of 58 students were taken into account as per statistical calculation. The inferential statistics revealed that the p -value was found to be statistically significant (p -value < 0.01), with a mean total post-reflection score of 26.12 (SD = 0.557, 95% CI [25.97, 26.27]) against a test value of 21, the two-sided test is highly significant ($t(57) = 70.01$, $p < 0.001$), and the one-sided test confirms the mean is significantly greater than 21 ($p < 0.001$). This indicates that, on average, participants' post-intervention reflections fall well within the "Excellent deep reflection" band of the Gibbs scoring rubric and the storytelling intervention effectively shifts the true population score into advanced reflective levels

INTRODUCTION

Being an educator, it has been closely observed that most of the time teachers are using the traditional strategy of delivering lectures through PowerPoints or the conventional whiteboard method. This has limited students' eagerness to think out of the box, and they try to absorb the same technique of teaching as part of their

learning. The current study aimed to implement teaching Anatomy and Physiology (Topic Integumentary system) through storytelling. The purpose was to assess the effect of such learning tools on the reflection of students through Gibb's Reflective model. The study opened new insights of utilizing the Pedagogy of storytelling for the learning and reflective scores of the students.

Review of Related Literature:

In the world of Education there is an important challenge and that is the complexity and the content has a dynamic nature (Kiselvov et al, 2022). There is an overload of content so due to this reason the interest from learning gets declined and creates a sense of confusion this makes difficult for the students to integrate the learning and develop a holistic view. Story telling is an important characteristic feature that elaborates the pattern or style of how we think, learn and construct the knowledge regarding the world (Kapsala et al, 2020). As per the cognivists the point that matters is how the thinking pattern of a learner gets aligned with the new knowledge that is provided irrespective of the method by which teaching is performed. As per the constructivists they believe that learner must always be at the focal point of the process of learning and many researchers believe on the fact that learner centered approach of teaching is more significant than teacher centered approach of learning (Mwelwa and et al, 2020). Story telling is a great way to develop the emotional, cognitive and social aspects in students. It provides an opportunity to the students to explore new ideas and also express their thoughts and emotions and hence facilitate in building knowledge amongst the students as they bring abstract thought and ideas and then structure them into valuable experiences (Bravo and et al, 2021). Story telling is found to engage the students; it also provides opportunity to role model good practices (Hardie and et al, 2020). Story telling has now been identified as the

approach that is used to bridge the gap between the facts and the learners understanding, in fact it has also been observed that the utilization of narratives is found to be more persuasive rather than the statistical data presentation (Csikar and et al, 2018). It is observed that the cognitive processing is greatly increased when the students are engaged in creating narratives. As per a recent study, an intervention was conducted on medical students to assess the effectiveness of teaching anatomy of brachial plexus through story telling pedagogy where the control group was taught via direct teaching method while the intervention group was taught through story telling method. The outcome was assessed using an agreement scale which exhibited a significant difference with p-value <0.05 in the intervention group (Akcaalan et al, 2025). Moreover, another interventional study was conducted to assess the instructional effectiveness and satisfaction level of students in terms of their perception and parents' opinions based on a 13-week implementation plan. It was observed that a high level of satisfaction has been obtained by learners through the story telling pedagogy (Saritepeci, 2021). In addition, the efficiency of storytelling for the course of anatomy was evaluated on term II medical students along with effects on GPA as one of the parameter where more than 90% of the students agreed to the fact that storytelling is a better method for them to comprehend anatomical concepts as it helps to activate the brain and improve student's overall performance as illustrated in Figure 1 (Colak et al, 2021).

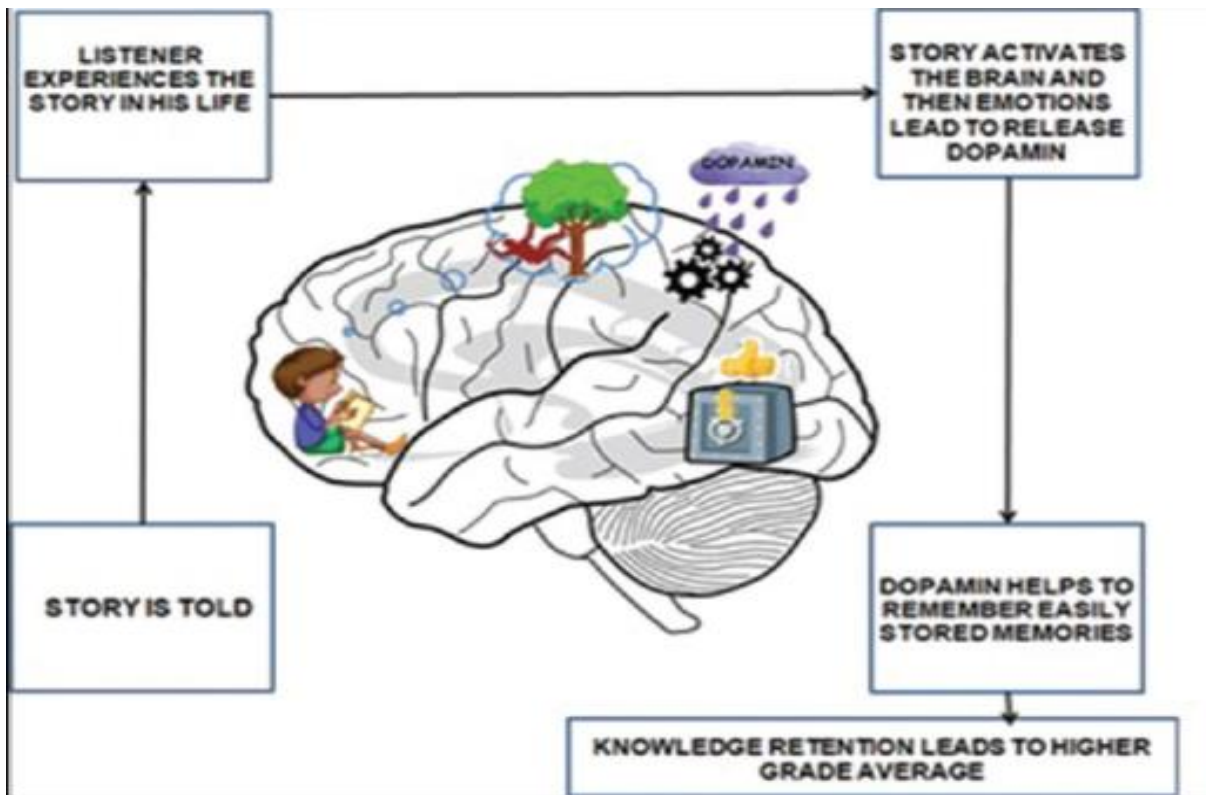


Figure 1: Colak, T., Orha, A.T., Tavas, O., Aksu, E., Guzelordu, D., Sivri, I., Bamac, B. and Colak, S., 2021. A new method in anatomical education of medical faculty: Storytelling. *Journal of the Anatomical Society of India*, 70 (2), pp.75-80.

Recent advancements in technology has brought a revolution in teaching medical education through innovative and novice teaching methods (Rabattu et al, 2023). This has encouraged narrative education as one of the promising methods to increase student engagement in the classrooms (Bankar et al, 2024). In addition to effective learning, narrative education also improved the abilities of the students to develop problem solving skills and empathy which actually is a key requirement in the field of healthcare (Zhou et al, 2023) as narrative education stimulate emotions and reflection among the students, this alleviates the dedication to care for an individual on humanitarian basis (Nash-patel et al 2023). This can also lead towards the development of critical thinking skills which again helps the students to prepare for their future challenges (Bresolin et al, 2022). Also, using narrative education such as

storytelling can enhance transpersonal awareness among students that leads to fruitful outcomes in their personalities (El Hussein et al, 2022). As per a recent study, Chinese nursing students possess an intermediate level of empathy that requires improvement (Wang et al, 2022); (Zhang et al, 2022). For instance, aorta more deeply used as a metaphor “King Aorta” in a recent study as part of a narrative education to symbolize its importance along with its sub branches as members of the royal family that enhanced student’s learning experience (Cilla et al, 2020). The ideas of teaching biology, more specifically anatomy through narrative education has widely been accepted by constructivist that focuses on learning via interactive methods (Roxburgh et al, 2021) that can ultimately generate new knowledge by the learners from an existing pool of knowledge and prior experience (Waite, 2022)

Research Methodology

The Research setting was Ziauddin University Faculty of Nursing and Midwifery (ZUFONAM). The target population was Students enrolled in BSN Year I of ZUFONAM. Quasi-Experimental design was used. No control group was used just to ensure that all the students receive a session of similar quality that was storytelling. This was also assured that no biasness is produced from the researcher's end

Sample Size:

Sample size of this study was calculated from WHO software for hypothesis testing for a population proportion (two sided test). The calculation was based on an anticipated population proportion of 0.63 with the test value as 0.42. The power of the test was taken to be 80 % and level of significance was 5%. The sample size was calculated to be 58.

However, the total number of students enrolled in BSN I comprised of 150 students. In order to maintain ethical transparency and equal learning opportunities, the intervention was delivered to all 150 students as part of their non-graded session. Despite offering the intervention to the entire class of 150 students, data from only 58 students was carried forward for analysis process. These 58 respondents were randomly selected from lottery method out of all participants who actually gave their informed consent.

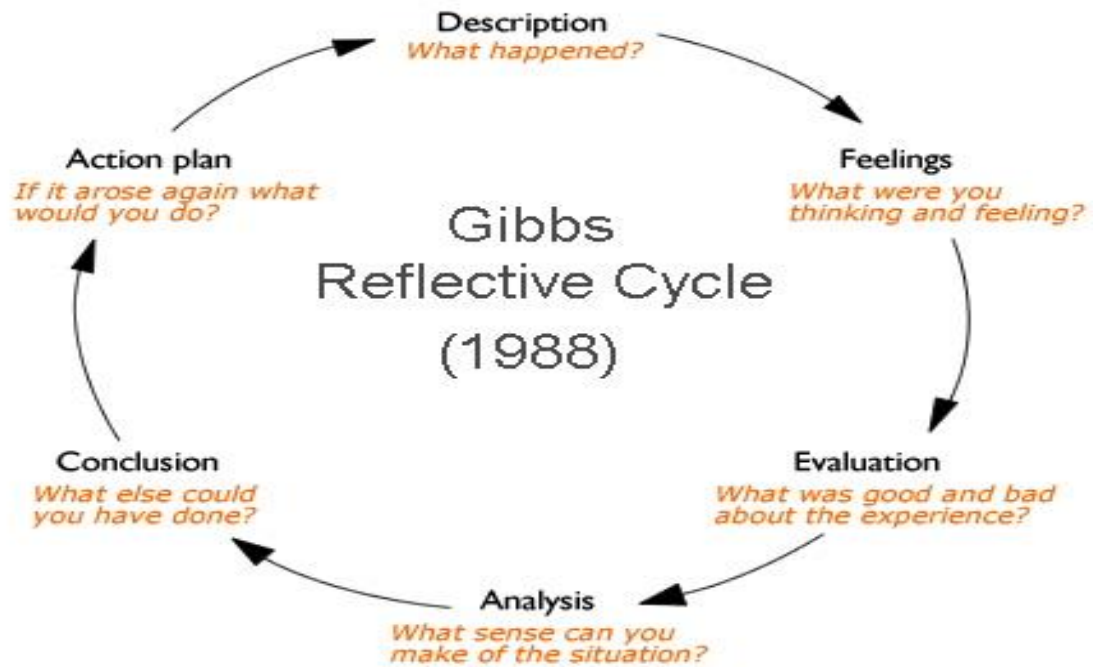
Sampling Technique:

Purposive sampling techniques were employed in this study. The research question aimed to assess the student's evaluation of education quality by teaching a unit of Anatomy and Physiology through story telling. For this study approval from Ethical Research Committee (ERC) and Head of the Department of the study setting was taken.

Sample participants from BSN YEAR 1 were selected purposively as they possess the required characteristic feature (enrolment in year I where the course of Anatomy and Physiology is offered) that was relevant to the study. The Inclusion Criteria was Students enrolled in the course of Anatomy and Physiology I in BSN program, Students willing to participate and Students who gave a written informed consent for participation. The Exclusion criteria were Post RN BSN and MSN students and Students who did not give informed written consent.

Method:

- Students were provided with a brief session on the study protocol for around 30 minutes where the primary investigator shared how the intervention would be preceded.
- Students who gave their written informed consent were recruited for the intervention.
- Following the briefing session, 150 students enrolled in BSN I were given an intervention on "Integumentary System" in the form of a story entitled as "The Grand Assembly of Integumentaria" where a script-based story was narrated to the students by the PI.
- The story included the basic and advanced concepts that covered the anatomical and physiological features of the integumentary system.
- Each storytelling session lasted for **60 minutes**, followed by **20 minutes of structured discussion**.
- Data was stored in locked cabinets, and the anonymity and confidentiality of the participants were completely maintained.
- The Gibb's Reflection comprised of the following components:



Standardization of the storytelling intervention:

Story content	Duration	Narration Style	Tone	Classroom setting	Instructor
The standard theory related to the topic of Integumentary system was extracted from text books Tortora, G. J., & Derrickson, B. H. (2023). Principles of anatomy and physiology (16th ed.). Wiley. A structured, evidence-based narrative was developed from the standard theory that covered structure and functions of epidermis, dermis,	Each storytelling session continued for 60 minutes , followed by 20 minutes of structured discussion .	Sequential storyline connecting anatomy with physiological processes. Scripted narration to ensure consistency.	Academic yet engaging tone. Professionally delivered, maintaining scientific accuracy. No humor or emotional exaggeration that may alter learning emphasis.	Same classroom for all participants.	The same trained instructor delivered all sessions.

hypodermis and skin appendages.					
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Data Analysis Procedure:

Data was entered and analyzed through STATA Version 17. For numeric variables, mean and Descriptive Statistics & Variable Profiles

1) Cohort Demographics

The cohort demonstrated a balanced gender distribution, providing a clean baseline for the

standard deviation was applied. For Inferential Statistics One sample t test was applied.

pedagogical trial without severe demographic imbalance.

Gender Category	Frequency (n)	Percentage (%)	Cumulative (%)
Male (1)	30	51.72	51.72
Female (2)	28	48.28	100.00

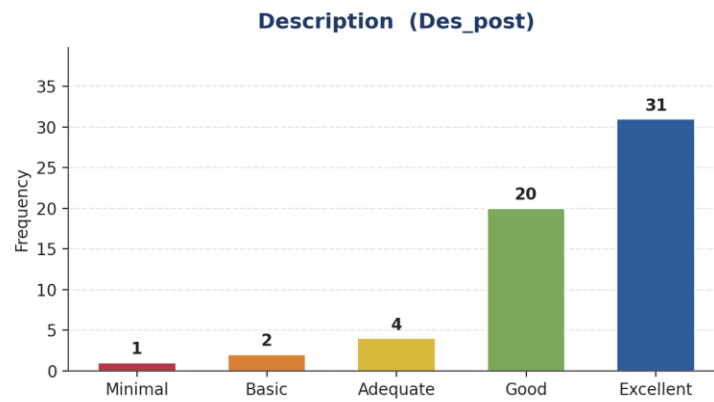
2) Post-Test Frequency Tables for Gibbs Components

The frequency structures for each stage of reflection are detailed below:

1. Description (Des_post):

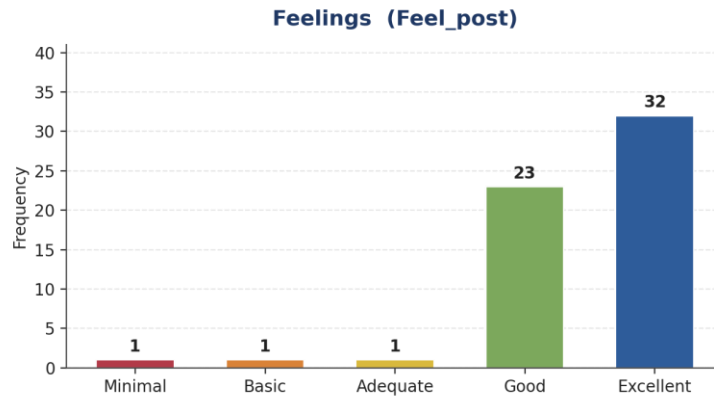
Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
1	Minimal	Superficial, minimal detail, lacks focus	1	1.72	1.72
2	Basic	Some description, missing key details	2	3.45	5.17

Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
3	Adequate	Adequate description, some clarity but incomplete	4	6.90	12.07
4	Good	Clear, detailed, mostly relevant	20	34.48	46.55
5	Excellent	Excellent, comprehensive, highly relevant	31	53.45	100.00
Total	58	100.00	—		



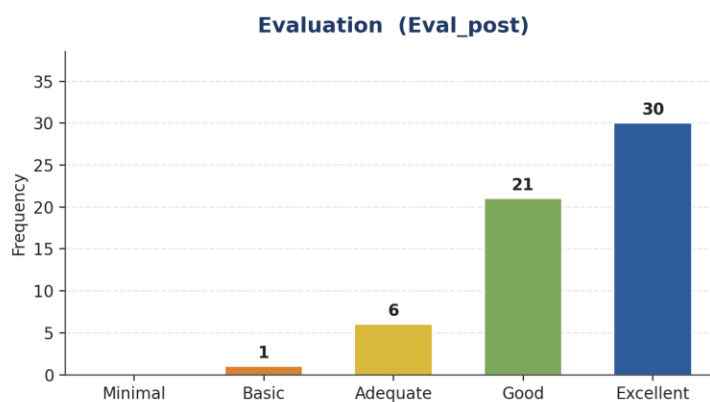
2. Feelings (Feel_post):

Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
1	Minimal	No emotions discussed	1	1.72	1.72
2	Basic	Mentions emotions briefly	1	1.72	3.45
3	Adequate	Some insight into feelings	1	1.72	5.17
4	Good	Clear reflection on emotions	23	39.66	44.83
5	Excellent	Deep and insightful reflection on emotions	32	55.17	100.00
Total	58	100.00	—		



3. Evaluation (Eval_post):

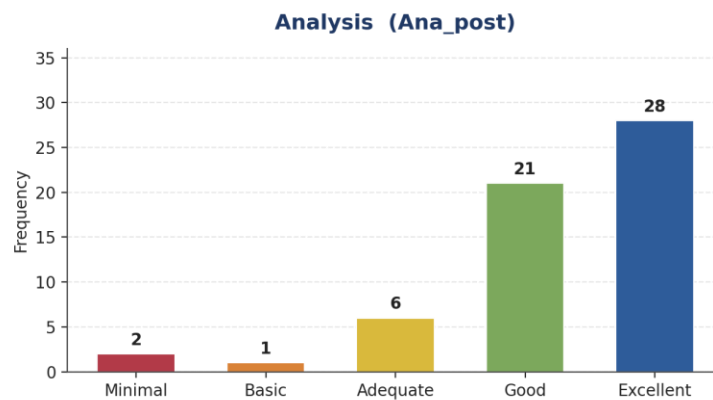
Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
2	Basic	Superficial positives/negatives	1	1.72	1.72
3	Adequate	Some evaluation, lacks balance	6	10.34	12.07
4	Good	Balanced positives and negatives	21	36.21	48.28
5	Excellent	Thorough, balanced, insightful evaluation	30	51.72	100.00
Total	58	100.00	—		



4. Analysis (Ana_post):

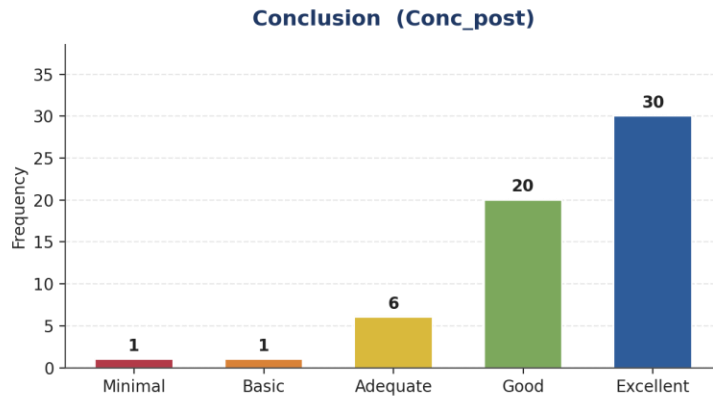
Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
1	Minimal	No analysis	2	3.45	3.45

Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
2	Basic	Superficial or descriptive only	1	1.72	5.17
3	Adequate	Some attempt at analysis	6	10.34	15.52
4	Good	Good analysis with some evidence	21	36.21	51.72
5	Excellent	Deep, critical, evidence-based analysis	28	48.28	100.00
Total	58	100.00	—		



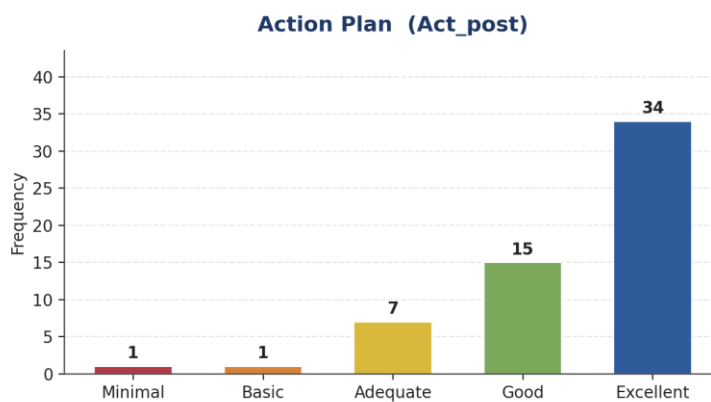
5. Conclusion (Conc_post):

Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
1	Minimal	No clear conclusion	1	1.72	1.72
2	Basic	Very limited learning points	1	1.72	3.45
3	Adequate	Some learning points identified	6	10.34	13.79
4	Good	Clear conclusion and learning points	20	34.48	48.28
5	Excellent	Strong, well-developed, meaningful conclusion	30	51.72	100.00
Total	58	100.00	—		



6. Action Plan (Act_post):

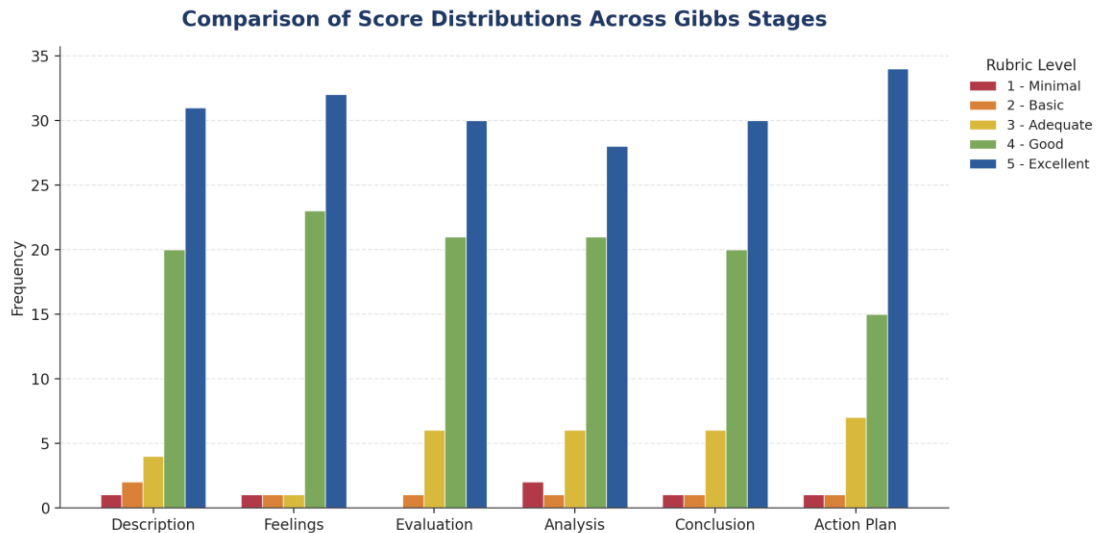
Score	Level	Gibbs Descriptor	Freq.	Percent	Cum. %
1	Minimal	No action plan	1	1.72	1.72
2	Basic	Very vague actions	1	1.72	3.45
3	Adequate	Some plan but incomplete	7	12.07	15.52
4	Good	Clear and realistic plan	15	25.86	41.38
5	Excellent	Specific, realistic, actionable and forward-thinking plan	34	58.62	100.00
Total		58	100.00	—	



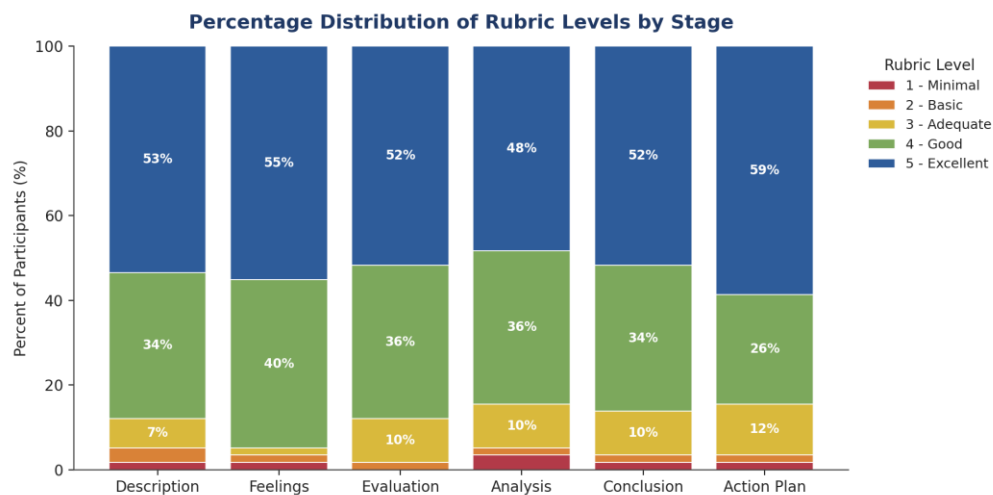
Graphical Presentation

The visuals below give an at-a-glance comparison across all six Gibbs stages and summarise the overall spread of reflection quality.

Score Distribution by Stage (Grouped Comparison)



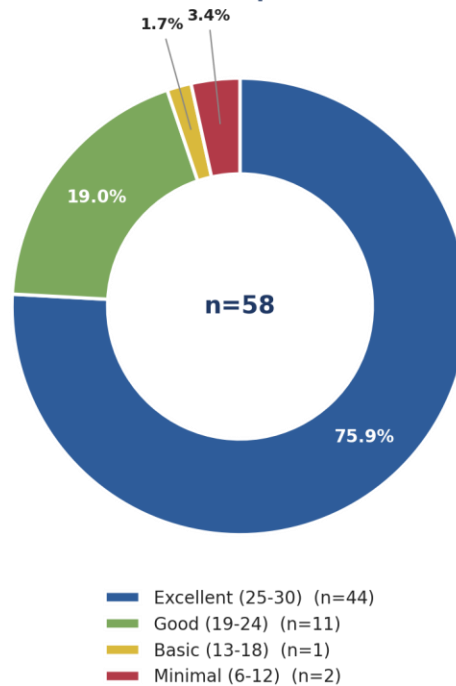
Percentage Composition by Stage



Viewed as proportions, over 85% of participants scored Good or Excellent on every stage, confirming a consistently strong standard of reflective writing across all six components of the Gibbs cycle.

Total Score — Interpretation Band Share

Total Post Score — Interpretation Band Share



Almost three-quarters (75.9%) of participants achieved a total score in the "Excellent deep reflection" band (25–30), with a further 19.0% in the "Good" band — together accounting for 94.9% of the sample.

Inferential Statistics: One-Sample t-Test on Total Post Scores

A one-sample t-test was conducted to compare the mean total post-reflection score against a hypothesized value of 21 (the lower boundary of the "Good reflection" band).

Obs	Mean	Std. Err.	Std. Dev.	95% CI Lower	95% CI Upper	t
58	26.12	0.0731	0.557	25.9735	26.2665	70.005

Hypothesis	Alternative	T statistic	P-value
H0: mean = 21	Ha: mean < 21	t = 70.005	Pr(T<t) = 1.0000
	Ha: mean != 21	df = 57	Pr(T > t) = 0.0000
	Ha: mean > 21		Pr(T>t) = 0.0000

Interpretation: With a mean total post-reflection score of 26.12 (SD = 0.557, 95% CI [25.97, 26.27]) against a test value of 21, the two-sided test is highly significant ($t(57) = 70.01$, $p < 0.001$), and the one-sided test confirms the mean is significantly greater than 21 ($p < 0.001$). This indicates that, on average, participants' post-intervention reflections fall well within the "Excellent deep reflection" band of the Gibbs scoring rubric

The directional right-tailed test confirms a highly significant result ($t = 70.01$, $df = 57$, $p < 0.001$). The narrow 95% confidence interval [25.97, 26.27] shows high precision in our sample estimate, indicating that the storytelling intervention effectively shifts the true population score into advanced reflective levels.

Extended Literature-Based Discussion

The primary objective of this study was to evaluate the efficacy of Storytelling as an instructional intervention in teaching Anatomy and Physiology. Overall the findings indicate that the p -value was statistically significant ($p\text{-value} < 0.01$), with a mean total post-reflection score of 26.12 (SD = 0.557, 95% CI [25.97, 26.27]) against a test value of 21, the two-sided test is highly significant ($t(57) = 70.01$, $p < 0.001$), and the one-sided test confirms the mean is significantly greater than 21 ($p < 0.001$). This indicates that, on average, participants' post-intervention reflections fall well within the "Excellent deep reflection" band of the Gibbs scoring rubric and the storytelling intervention effectively shifts the true population score into advanced reflective levels

These results align with the prior Research highlighting the benefits of Storytelling pedagogy. Tradition Anatomy and physiology teaching approach depends upon Rote memorization which enhances the cognitive load on students. By embedding structural concepts into narratives our findings support Dual coding Theory (Paivio, 1986) and Cognitive load theory (Sweller, 1988).

Pedagogy of storytelling is an innovative tool to enhance the understanding of students through emotional engagement. The results of our learning align with the Research by Parker and Smith (2022) that structural narratives can have a great impact in reducing cognitive load in the teaching and learning of basic health sciences. Similarly, Al-Hussami et al. (2023) showed that narrative

pedagogy was also effective in improving the conceptual integration of pre-licensure students, as it helps them to integrate the basic physiology with clinical reasoning.

The cognitive-experiential self-theory (Thompson and Taylor, 2021) emphasizes on long-term memory and an increase in conceptual understanding, which can happen through emotional engagement of students.

Storytelling is one of the most cost effective simulation techniques, particularly in the context of a regional system of health care as in Pakistan, where the student: teacher ratio is high, and clinical placement opportunities are limited. If students are trained at an early age, they will learn the "thinking" skills to think reflectively at higher levels even in more complex clinical scenarios, which will benefit them in future," wrote Haider and Raza (2025).

Recommendations:

Based on the data and latest Research we recommend that Faculty Training Programs on the pedagogy of Storytelling must be implemented to further utilize this effective tool in the teaching of other complex topics of Anatomy and Physiology such as the renal, cardiovascular and neuroendocrine system. Training programme will facilitate the faculty to transform traditional lectures into narratives. This transition will reduce the cognitive load and enhance conceptual understanding of students

Ethical Considerations:

Approval was taken from Ethical Review Committee of Ziauddin University. The anonymity and confidentiality of the data was maintained and data collected was stored in locked cabinets. Unique codes were assigned to the Gibb's Reflective Score sheet rather than taking student's names or enrollment numbers.

All collected data was stored securely in password-protected electronic files and locked cabinets accessible only to the principal investigator. Data was used solely for research purposes. It was the decision of the participant to take part or decline from the study with no impact on their Academic grades, clinical evaluations, or relationship with faculty members. Participation was entirely voluntary. No incentives were offered that could compromise the voluntary nature of participation. Students could withdraw from study at any point without any academic penalty or negative consequences.

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