



**MELAKA-MANIPAL
MEDICAL COLLEGE**

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed to be University under Section 3 of the UGC Act, 1956)

Invoking the muse to enhance collaborative active learning and knowledge retention: A unique experiment in medical education

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Context:

- Curriculum delivery at Melaka Manipal Medical College(MMMC), Manipal, India in the preclinical year is predominantly lecture based
- At MMMC, PBL , SDL , CBL and practical sessions contribute to active learning
- Few learning activities employ a creative mode
- **The present activity** engages medical students in collaborative active learning using a creative mode
- This has a bearing on students acquiring the knowledge and skills, essential to their profession and makes learning fun and interesting

Intervention:

Each group (n==11) of students selected one clinical topic based on which they constructed an integrated case scenario with case title, case history, clinical signs and symptoms, laboratory investigations and treatment. The case scenarios had elements of anatomy, physiology, biochemistry, pathology, microbiology and pharmacology



The case scenarios were validated by a clinician based on a questionnaire and checked for plagiarism using 'Turnitin' software



The students used the validated case scenarios as a template to compose a song. They were also advised to compose suitable music. The lyrics of the songs were submitted to the faculty. Students rehearsed the case scenario songs supervised by faculty as a screening measure prior to presentation



Students were instructed to include slides showing the title of the case scenario, the salient features/lyrics and to synchronize them with the presentation



Groups of students (n==11) presented the case scenario songs to an audience consisting of faculty and classmates. Students in the audience wrote down the diagnosis of each case and submitted it to faculty.



A panel of judges comprising of faculty from different departments graded the performance based on predefined indicators on a 5 point Likert scale



Faculty who attended the activity expressed their opinion using a questionnaire



Students appeared for an MCQ test based on the content of the case scenarios the following week and gave their feedback on their learning experience

Observations:

Table 1 : Sample case scenario 1

Down the Gastric Hole

Lisa, a 30-year-old woman, was a smoker and consumed alcohol often. She also liked to eat spicy food. She had been suffering with sharp epigastric pain. The pain was accompanied by nausea and was relieved by food. The pain normally started 2 to 3 hours after meals. During this period, she did not lose any weight. One day, she vomited and noticed blood in her vomitus.

At the hospital, a nasogastric tube insertion revealed blood in the stomach which cleared after gastric lavage with cold saline. Immediate endoscopy revealed scarring of the pylorus with a 1.5 cm ulcer in the first portion of the duodenum. Biopsy of the ulcer revealed curved bacilli with Warthin-Starry silver staining and a positive rapid urease test.

To neutralize the stomach acid, antacid was prescribed and omeprazole was given to block acid production. She was advised to take food containing probiotics such as yogurt and aged cheese and not to take too much milk. She was advised to quit drinking and smoking.

Diagnosis: Peptic ulcer due to over secretion of gastric acid (Not revealed to other student groups)

Table 2: Sample case scenario 2

Silent killer in factories

Sajith, a 52-year-old man working in a plastic factory, presented to the medical OPD with several weeks' history of nausea, headache, dizziness, confusion and generalized weakness. He also developed difficulty in breathing during the last few days.

On examination, his body temperature was 36°C, pulse was weak with a rate of 92/minute. His pupils were dilated and he had a red flush on the skin. His breath smelt of almonds. His blood tests revealed that his plasma lactate levels were 18mmol/L. (0.5 to 1mmol/L). He also had elevated levels of methemoglobin.

Based on these findings, he was provided with 100% oxygen, and was treated with hydroxycobalamin.

Diagnosis: Chronic cyanide poisoning (Not revealed to other student groups)

Table 3: Opinion of the clinician who vetted the case scenarios

Attributes of case design per se	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree(5)
1. Is the case constructed based on guidelines given viz., case title, case history, clinical signs and symptoms, laboratory investigations and treatment?					11
2. Do you feel the title is relevant to the case?			2	6	3
3. Did the case history, clinical signs and symptoms, laboratory investigations and treatment aspects correlate with each other?		2	3	2	4
4. Problems designed have suitable clarity			3	6	2
5. Problems are of an appropriate difficulty level for undergraduate medical students					11

Table 4: Lyrics of case scenario ' Silent killer in factories'

I was 50 when I first saw you
I closed my eyes and the headache
started
I'm fainting there
Feeling dizzy and so nauseous
See the smoke, see the plastic pollution
See you make you through the ER and
say Hello
Little did I know
That I was unconscious with difficulty in
breathing
And my doctor said stay away from
pollution
And I was crying on the staircase
begging my weakness to go
.

And I had red flush on skin
Almond breath and low BP
Cardiac arrest, I didn't see this coming
You are my doctor and I am your patient
It's a sad story doctor please save me
They say I have neurological problems
Plasma lactate level 18mmol
Way too high
Methemoglobin pretty high
Based on the findings, hydroxycobalamin
100% O₂ and will cure me
Don't be afraid, we'll make it out of this
mess
It's a sad story, doctor please save me

Table 5: Students' performance in diagnosing the cases:

Group number	Topic chosen	Title given by students to the case scenario	Percentage of students who could arrive at the correct diagnosis	Percentage of marks obtained by the groups for presentation of case scenarios as assessed by faculty
Group 1	Peptic ulcer due to over secretion of gastric acid	Down the Gastric Hole	96	86
Group 2	Megaloblastic anemia	Pale Tommy	90	75
Group 3	Glucose-6-phosphate dehydrogenase deficiency	Lemony Kid	98	81
Group 4	Iron deficiency anemia	Tired Pale Julie	97	83
Group 5	Multiple myeloma	Rohan's refractory trouble	90	74
Group 6	Sickle cell anemia	Pallory Zane	91	70
Group 7	Obstructive jaundice	Sunflower woman	88	84
Group 8	Myocardial infarction	Jim's unhealthy habits	91	73
Group 9	Chronic cyanide poisoning	Silent killer in factories	70	93
Group 10	Nephrotic syndrome	Swollen Sam	88	76
Group 11	Alcohol intoxication with methanol poisoning	Lai's drinking problem	82	79

Table 6: Student's feedback on attributes of the activity

<p>Dear students, Please respond to the following statements regarding the activity</p>	<p>Sum of agree and strongly agree responses in percentage</p>
1. Increased knowledge	69
2. Improved critical thinking	72
3. Activated prior knowledge	75
4. Increased integration of concepts between subjects	70
5. Improved clinical orientation	70
6. Improved motivation to learn	59
7. Increased active learning	70
8. Promoted self-directed learning	68
9. The activity taught us how to work as a team (collaborative learning)	74
10. The activity as a whole was enjoyable	69
11. The activity was difficult	25
12. The activity was time consuming	64
13. Composing the song was difficult	53
14. Composing the music was difficult	48
15. The activity made us think creatively	73

Table 7 : Faculty feedback on the activity

Please express your opinions on the following attributes of the activity	Sum of agree and strongly agree responses expressed as percentage
1. Increased knowledge	86
2. Improved critical thinking	100
3. Activated prior knowledge	100
4. Increased integration of concepts between different subjects of the pre and para clinical years	100
5. Improved clinical orientation	86
6. Improved motivation to learn	100
7. Promoted self-directed learning	71
8. Promoted collaborative learning	86
9. Increased peer-assisted learning	100
10. Promoted creative thinking	100

Table 8: Sample MCQs related to case scenarios

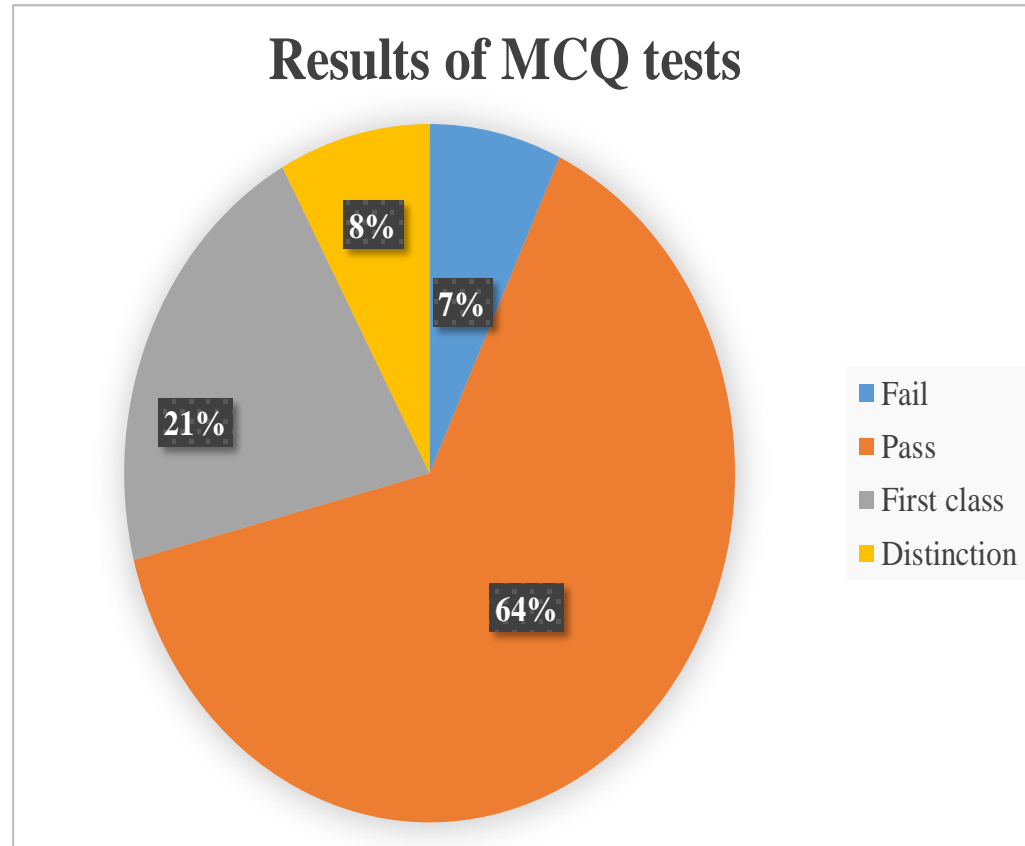
Glucose-6-phosphate dehydrogenase deficiency

1. Triggers for precipitation of symptoms of glucose-6-phosphate dehydrogenase deficiency include which of the following?
 - a. Glutathione
 - b. Bilirubin
 - c. Trimethoprim*
 - d. Vitamin B6
2. Which among the following is the most characteristic feature of G6PD deficiency?
 - a. Low RBC count
 - b. Low hemoglobin
 - c. Heinz bodies in RBCs*
 - d. High total bilirubin

Chronic cyanide poisoning

1. Which among the following is a clinical feature of cyanide poisoning?
 - a. Decreased blood lactate
 - b. Bradycardia*
 - c. Acetone breath
 - d. Metabolic alkalosis
2. Which among the following justifies treatment of cyanide poisoning with hydroxycobalamin?
 - a. Prevents binding of cyanide to complex IV of respiratory chain
 - b. Helps in excretion of cyanide as cyanocobalamin*
 - c. Promotes ATP synthesis
 - d. Prevents uncoupling of electron transport and oxidative phosphorylation

Figure 1



Conclusion:

Engaging students in case scenario design followed by presentation using a creative mode consisting of songs and music, promotes collaborative active learning leading to knowledge retention, essential in the practice of medicine.