



# The Use of Crossword Puzzles as an Educational tool in Teaching Undergraduate Pathology

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**ABSTRACT**

**Objective :** To design, implement and evaluate the use of crossword puzzles (CWP ) as an educational tool to improve the concepts and vocabulary in the topics of hematology for undergraduate medical students.  
**Design:** CWPs were created using free online soft ware and were administered in five sets after completion of the related topics in hematology. Perception of the CWP was taken using a survey instrument integrating a 5 point Likert scale.  
**Assessment:** over 90% of the students indicated that CWP helped them improve their vocabulary and concepts.  
**Conclusion:** Students perceived that CWP helped them in their learning of concepts in hematology and in improving their vocabulary.

**KEYWORDS**

Crossword puzzles- Educational tool- Pathology

**INTRODUCTION**

Pathology is a science bridging the preclinical and clinical subjects in the undergraduate curriculum. The students are exposed to many new terms and concepts mostly in the chapters of neoplasia and hematology. [1] To reinforce these concepts and thereby help the students learn these topics is a challenge.

Many studies indicate that incorporating active learning strategies improve understanding and learning. Small group learning activities helps to improve teacher student participation and feed back to students. One of the forms of active learning, games and puzzles which help to review, summarize and find out gaps in knowledge.[1] They have been used to supplement traditional teaching in many subjects.

Crosswords in particular help to reinforce the concepts and vocabulary of the students as the key words are centred around them.

**MATERIAL AND METHODS**

**Ethical approval:** permission to conduct student surveys was obtained from the institute ethical committee

**Activity:**

Crosswords (five sets) were created in the topics of haematology using a free online soft ware-(Eclipse crossword.com). They included two in the disorders of RBC, two in disorders of WBC and one in Platelet disorders. Clues were constructed with words concerning nomenclature and concepts from the topics in haematology. The puzzles were administered to a regular batch of 152 students in their fourth semester after the completion of the topics. Students were divided into groups of five, randomly and each group was given the puzzle grid along with the clues. The last twenty minutes of the class was allotted for answering the puzzle. A reward of one mark for each complete set, with a maximum of five marks, to be added to the internal assesment, was announced. After completion of the puzzle, the key was discussed. The scores obtained were tabulated. (Table 1) A questionnaire incorporating a five point Likert scale was given at the end of the session to evaluate their perception.

**RESULTS**

Student performance: The scores obtained by the groups in the five sets are tabulated. (Table -1)

**Table 1: Scores obtained in the five sets of crosswords**

Percent score	Set 1	Set 2	Set 3	Set 4	Set 5
< 60%	22	12	13	9	1
61%-80%	2	6	6	10	6
>80%	1	2	6	6	18
Total number of groups =	25	20	25	25	25

No group could answer the first puzzle completely correct. (100% score- Nil).

This situation improved to 15% when the students answered the final set.

**Table 2:**

Scores	1 <sup>st</sup> set	5 <sup>th</sup> set	Total sets
<60%	22	1	23
61% - 80%	2	6	8
>80 %	1	18	19
Total number of groups per set =25.	25	25	50

( p value - <0.001)

**Program evaluation:**

Students' perception of crosswords as an educational tool was obtained using a seven item questionnaire, integrating a five point Likert scale.

**Table 3: Students perceptions of crossword as a study tool**

Q.No	Question	A/SA	Neu-tral	DA/SDA
1	I enjoyed doing the crossword	100%	---	---
2	They helped me improve my concepts	95 %	5%	---
3	They helped me improve my vocabulary	90%	10%	---
4	They were a waste of time	---	10%	90%

5	I recommend their use in other topics	85%	15%	---
6	The content reflected the key concepts	95%	5%	---
7	They helped me in working together	95%	5%	---
8	The test reward was alluring	80%	20%	---

A-Agreed; SA-Strongly Agreed; DA-Disagreed; SDA-Strongly Agreed

## DISCUSSION

Undergraduate pathology curriculum introduces many new terms and concepts to the students over a short period of time. To provide adequate practice and to reinforce these concepts is a challenge. Small group teaching, which is more student centred, encourages student participation and interaction and promotes personal responsibility of learning. Crossword puzzles are one such tool to promote small group learning. Studies conducted by Saxena et al and Htwe et al have shown that crossword puzzles provide an opportunity for small group discussions, recalling essential concepts and for improving their critical thinking.

This study was carried out to determine students' performance and perception in the various topics of haematology using crosswords as an active way of learning and improving their terminology/vocabulary.

Students' performance improved significantly from the first set of crosswords to the last set (Table 2), reflecting the purpose of crosswords in improving terminology, spelling and concepts. Similar results were observed in studies conducted by others in pathology and pharmacology.<sup>[1,2,3,4]</sup>

There are different types of small group learning activities with varying degrees of teacher student participation and feed back to students. Thus it is difficult to say that crosswords are one of the best among them.<sup>[1]</sup> Some aspects which are relatively specific to crosswords include their ability to help reinforce concepts and vocabulary in students as the key words are centred around them.

CWPs also help students evaluate their current state of understanding in an informal way and help clear their misconceptions/ misunderstandings. As they proceed with the completion of the puzzle, the already completed words help them in integrating information needed to complete the rest of them.<sup>[1]</sup>

CWPs also form a backdrop for immediate team building and camaraderie as the students depend on each other to complete the puzzle. The reward of one mark for each complete puzzle to be added to the internals was also a trigger to motivate learning. The competitive aspect also provides an environment where the students can test their skills in a demanding situation.

## CONCLUSION

Crosswords provide an opportunity for critical thinking, competing, discussing and removing misconceptions. They help students reinforce concepts by using the essential terminology associated with these concepts. Though a small group learning method, they can be applied in large class rooms as well.

## REFERENCES

1. Anurag Saxena, Raenelle Nesbitt, Punam Pahwa, Sheryl Mills: Crossword Puzzles- active learning in undergraduate Pathology and Medical education. Archives of Pathology and Laboratory Medicine -Vol 133, Sept 2009.
2. Htwe TT, Sabaridah I, Rajyaguru KM, Mazidah AM: pathology crossword competition: an active and easy way of learning pathology in undergraduate medical education. Singapore Medical Journal 2012;53(2) 121.
3. Samit Shah, Launa M.J.Lynch, Lilia.Z Macias- Moriarity.: Crossword Puzzles as a tool to enhance learning about Anti Ulcer drugs. American Journal of Pharmaceutical education 2010;74 (7).
4. Tricia M. Davis, Brooke Shepherd, Tara Zwiefelhofer: Reviewing of Exams: Do Crossword Puzzles Help in the Success of Student Learning . The journal of Effective teaching, Vol.9, No3, 2009.4-10.