Incorporating Physical Manipulatives for Tactile Learning into an Integrated Pharmacotherapy Curriculum

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BACKGROUND

PC

PRESBYTERIAN COLLEGE

SCHOOL of PHARMACY

- Challenges exist in the instruction and learning of antimicrobial spectrum of activity (SOA).
- Learners may utilize rote
 memorization to prepare for
 examination, which is not an
 effective evidence-based strategy for
 studying material.
- Learners often have a learning style that can guide study strategies.
 - VAK model¹: Visual, Auditory, Kinesthetic
- Currently, no data is published on the use of kinesthetic tools in pharmacy education.

OBJECTIVE

 To describe differences in academic performance in an infectious diseases (ID) integrated course following implementation of kinesthetic blocks as a learning tool.

METHODS

- Students enrolled in Fall 2017 ID module were provided a set of kinesthetic blocks to model bacterial pathogens and antimicrobial SOA.
- Course and examination data were used to compare overall and SOA question performance from Fall 2017 to Fall 2016, prior to implementation of blocks.
 - A voluntary survey was
 disseminated to collect baseline
 demographics, quantify use of
 blocks outside of the classroom
 as a study tool, and collect
 student self-reported
 learning styles.
- This study was approved by the Institutional Review Board at Presbyterian College School of Pharmacy.

IMPLEMENTATION

Figure 1. Process for Course Integration

Planning

- Incorporated into P3 pharmacotherapy curriculum
- Fall 2017: PHRM 7110ID 5 credit hours
- Spring 2018: PHRM 7113
- Psychiatry 2 credit hours

Preparing

- Purchased blocks and portioned sets
- Sets contained two blocks of each color
- Color-coded key matching block to bacterial pathogen (see Figure 2)

Offering

- Offered each learner a set on day 1 of course
- Learners signed out a set for duration of course after description of use
- Assessed a \$10 fee if blocks not returned at end of course

Figure 2. Bacterial Pathogen Key for Blocks



- Maroon: Methicillin-resistant *S. aureus* (MRSA)
- Red: StaphylococcusOrange: StreptococcusYellow: Enterococcus
- Green: *H. influenzae, M. catarrhalis*
- Light blue: P. mirabilis, E. coli, K. pneumoniae
- Dark blue: *P. aeruginosa*Black: Gram positive anaerobes
- Brown: Gram negative anaerobes
- White: Atypical pathogens

Figure 3. Active Learning With Blocks In Course

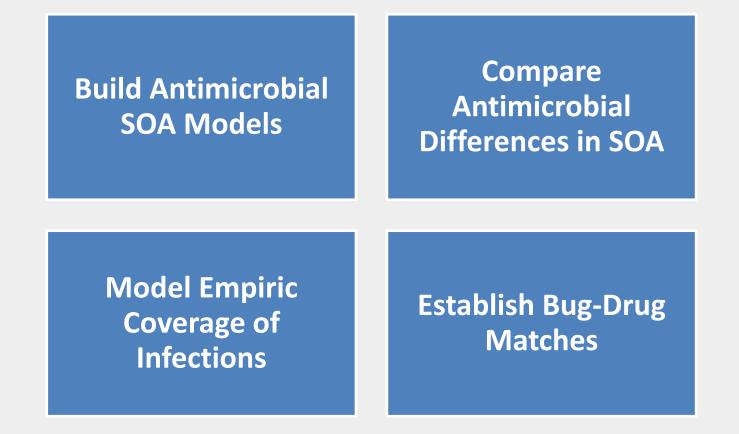
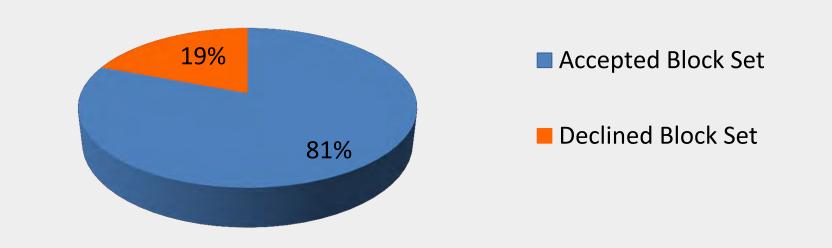
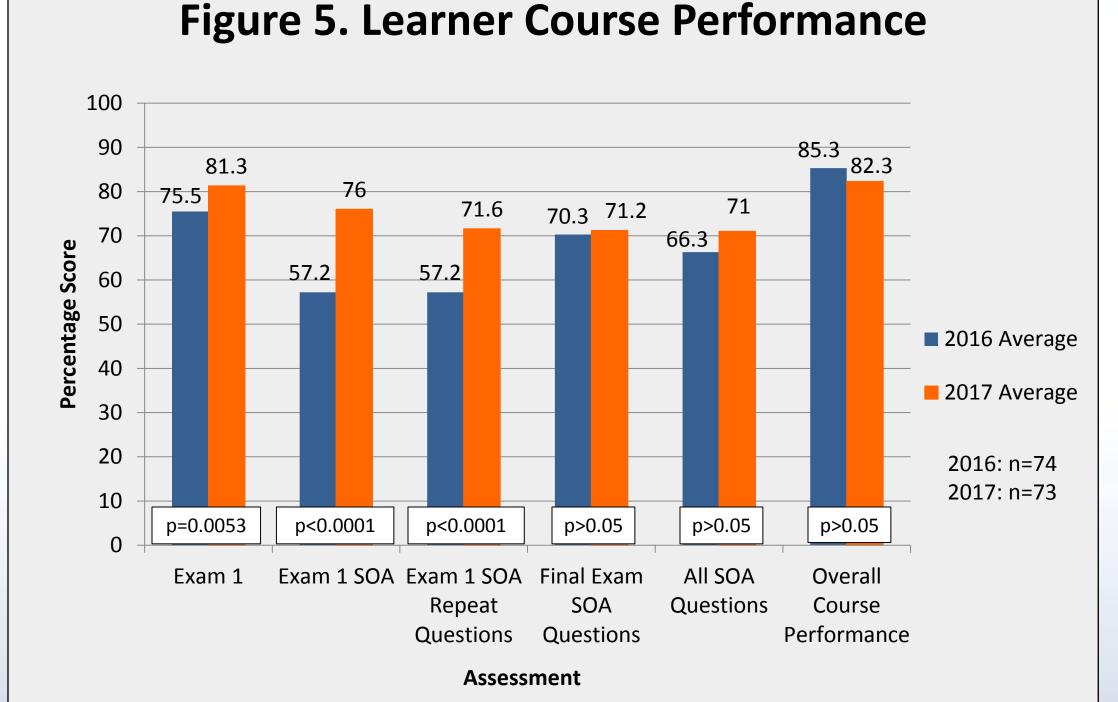


Figure 4. Acceptance of Blocks By Learners (n=73)



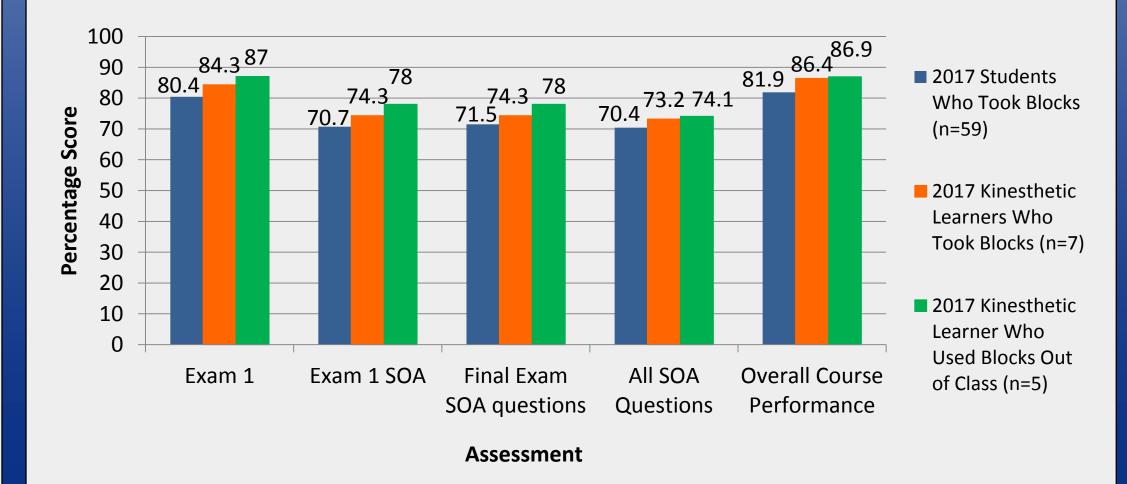


RESULTS

Table 1. Survey Response (n=39)

Demographic information	N (%)
Male	8 (20.5)
Female	31 (79.5)
20-29 years of age	34 (87.2)
30-39 years of age	5 (12.8)
Identifies as visual learner	20 (51.3)
Identifies as auditory learner	6 (15.4)
Identifies as tactile/kinesthetic learner	9 (23.1)
Identifies as unsure of learning style	4 (10.3)
Out-of-class use of blocks	N (%)
Used blocks as study tool outside of classroom time	20 (51.3)
Used blocks to build models	12 (30.8)

Figure 6. Tactile Learner Subgroup Performance



DISCUSSION

- Improved performance was seen on short-term retention assessments following course use of kinesthetic blocks.
- No difference in performance on items assessing long-term retention of material.
- Limitations include:
 - Change in course structure occurred from 2016 to 2017.
 - Survey yielded low response (53.4%) with lack of ability to account for student baseline academic performance.
 - Use of blocks in the course was front-loaded.
 - Student learning styles were self-reported.

CONCLUSION

- The incorporation of kinesthetic blocks into an ID integrated pharmacotherapy course was associated with overall improved aggregate performance compared to data from the previous year on initial assessment of material.
- No improvement in aggregate performance was seen on longitudinal assessments.
- Kinesthetic blocks may be a useful study tool to augment learning of SOA for self-identified tactile learners both in and out of class.

REFERENCES

1. Fleming ND, Mills C. *To Improve the Academy*. 1992;11:137-155.

DISCLOSURE

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:

All authors have nothing to disclose.