ASSessing PreService Teachers’ Understanding of Disease and Its Spread using Scientific Illustrations and Virtual Labs

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SEQUENCE OF PRESENTATION

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Background: Disease and its Spread – What & Why?

- The purpose of the study was to assess the knowledge and awareness of elementary preservice teachers toward disease and its spread.
Vamos et al. (2020) conducted a study that concluded one health education course might be beneficial for general education teachers to increase their knowledge and preparation to teaching school health.

Landin (2015) conducted a study of “Rediscovering the forgotten benefits of drawing” which showed the significance of science through drawing.

Darling-Hammond et al. (2007) explained how teachers learn certain teaching methods and targeted pre-service teachers as audience that are interested in the education field as audience.

Mosley et al. (2002) finding indicated “Effect of Teaching Outdoor Environmental Education on Preservice Teachers’ Attitudes toward Self-Efficacy and Outcome Expectancy,” which showed that preservice teachers' self-efficacy was strong prior to the program, stayed unaffected by their teaching experiences, but declined dramatically 7 weeks after teaching.

Mason et al. (1991) discuss the need of the image of a scientist to change because it affects the learning environment of certain students.

Flick (1990) also attempted to investigate Greek children’s impressions of scientists and their work through drawings and semi-structured interviews.

Chambers (1983) discusses the “Stereotypic Image of the Scientists: The draw-a-scientist test” discusses the social image of a scientist and how that image has changed over the years as science has progressed.
Methods

- Preservice teachers enrolled in the class, “science methods for teachers,” were the participants in the study.

- The study was first conducted with a **pilot survey** that consisted of 2 open-ended questions. The survey was given 19 participants.

- Following the pilot survey, the virtual interactive labs (pre-post assessments) consisting of 5 multiple choice questions on disease and its spread knowledge assessments (explorelearning, 2022) was taken by twenty-one participants.

- Lastly, the final survey which consisted of 6 open-ended questions was conducted with fourteen participants.

- Pre-post assessments were administered in the 2nd and 4th week of the spring semester, respectively. Preservice teachers were given 40-45 minutes to complete the virtual lab and survey based disease and its spread.
### Pilot Survey Results

<table>
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<tr>
<th>Questions</th>
<th>Responses</th>
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| 1. Explain the understanding of disease and its spread by drawing.        | - The preservice teachers answered this question using the method of drawing and by this, there were many common indicators used such as, coughing, sneezing, touching, etc.  
- Broadness of the illustrations also were demonstrated by how the preservice teachers exactly pictured disease and its spread. Depicted in image 1 and 2.                                                                                           |
| 2. Provide a brief description of the drawing.                             | - Since many of the preservice teachers used the method of labeling on the pictures, it was quite easy to explain what they saw.  
- However, even with the different illustrations the preservice teachers drew out, everyone used similar vocabulary.  
- This showed that most students used the same terminology when describing disease and its spread but when it came to illustrating their knowledge on disease and its spread, they all had different viewpoints. |
1. Explain disease & its spread by drawing.  10.21.21

- disease
- spread
- close contact
- spread brings it home

2. Write about your drawing.
Disease spreads from close contact, sharing drinks, etc.说一个感染的人在某人附近工作。第二个是现在从密切接触的人得到病毒。他们回家后工作。他们为家人做饭。他们在家呼吸。整个家庭都生病了。这持续了…
Virtual Lab (Pre-Post Online Assessment) Results

- Pre-post online assessment results indicate as shown that most of the preservice teachers were able to incorporate their knowledge from the first assessment and virtual lab worksheets into the post-assessment and achieve a higher score. Results are depicted in Figure 1.

![Bar chart showing scores of students in pre- and post-assessments](image-url)
<table>
<thead>
<tr>
<th>Questions (Q)</th>
<th>Answers (A)</th>
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<tbody>
<tr>
<td>1. Below draw and reflect upon your understanding of disease spread?</td>
<td>Many of the preservice teachers answered this question by indicating the causes of diseases such as touching, coughing, sneezing, etc. This is reflected in the viewpoint of the students and how they identified the spread of disease.</td>
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<td>2. What is your definition of disease spread?</td>
<td>Most of the preservice teachers would describe what is portrayed in question number one and go off the image they drew out as reference while others would go in more of an in-depth explanation to how and why diseases spread.</td>
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<td>3. What type of vocabulary would you use to describe this?</td>
<td>The preservice teachers chose terms such as contagious, germs, bacteria, contact, sickness, etc. Their usage of these terms defined their knowledge of disease and its spread.</td>
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<td>4. Would you learn better about a specific disease using pictures or reading off content? Or both?</td>
<td>Figure 2 represents the results from this question.</td>
</tr>
<tr>
<td>5. What are some diseases that you are familiar with?</td>
<td>Diseases such as coronavirus, flu, cold, etc. were commonly used by the preservice teachers.</td>
</tr>
<tr>
<td>6. What are the common symptoms of these diseases?</td>
<td>Symptoms such as coughing, pain, nausea, fatigue, and vomiting were often used as an answer.</td>
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Figure 2: (Q4) Learning methods
The findings from the current study which is related to drawings and their relation to understanding the scientific content are related to the findings of Chambers (1983), Flick (1990), Mason et al. (1990) because they discuss the social image of a scientist similarly like the present study, which is to discuss the viewpoint of disease and its spread through the perspective of preservice teachers.

Furthermore, Darling-Hammond, Branford, Lepage, Hammerness, and Duffy (2007) and Mosley’s et al. (2002) explains how pre-service teachers learn certain teaching methods. however, it does not regard information on the teaching of disease and its spread.

However, Landin (2015) explains that drawing was a social science research method that began in the early 20th century but does not mention pre-service teachers’ understanding on disease and its spread.

Vamos, Xie, & Yeung (2020) recent study concluded that health education is beneficial for the preservice teachers to increase their knowledge and preparation for teaching school health. Although the research assesses pre-service teachers' knowledge of health education through surveys and quantitative data, it lacks assessing preservice teachers' knowledge of disease and its spread.

In conclusion, there is a limited amount of research done over assessing preservice teachers’ understanding of scientific illustration and no research done on their understanding of disease and its spread.
Conclusion

- The study overall suggest that the preservice teachers improved their knowledge and awareness of disease and its spread.
- Findings also suggest that improving the awareness and understanding of disease and its spread are essential to introduce to preservice teachers to make them aware of knowledge particularly in the fields of flu, pathogen, infection, bacteria, virus, contagious, disease, epidemic, and infectious diseases.
Selected References


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