Constructing Arguments: Investigating Pre-Service Science Teachers’ Argumentation Skills in a Socio-Scientific Context

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Did pre-service science teachers’ improve their ability to construct scientific arguments through instruction in a science and society class?
Toulmin Argumentation Protocol
Most believe that climate change, or global warming, is caused by an increase in human production of greenhouse gases, particularly carbon dioxide. A strong correlation has been found between recently inclining temperatures and rising carbon dioxide levels in the atmosphere.

Because

Many factors contribute to climate change, and we must recognize that restricting greenhouse gases may not necessarily be the best or only way to reduce climate change.

In view of

The fact that the earth’s climate is changing is a worldwide consensus.

So it is true that carbon dioxide is a greenhouse gas

Without greenhouse gases, our planet would reach a temperature too cold for some, if not all, life.

It is imperative that we look at more than just greenhouse gasses as the sole cause of climate change.

Adapted from Toulmin (1988)
<table>
<thead>
<tr>
<th>Sample</th>
<th>Data Collection</th>
<th>Data Analysis</th>
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</thead>
<tbody>
<tr>
<td>7 pre-service secondary science teachers</td>
<td>Pre-post papers written by students</td>
<td>Analyzed using a rubric developed by the researchers</td>
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</table>

**Conclusion**

No significant difference from pre-post. 
$\chi^2(1)=1.29, p=.26$ (Friedman Rank Sum)

*Effect size:*

A=0.74

*A Vargha-Delaney’s A was used to compute effect size*

Vargha-Delaney (2002) set the following values:

0.56 = small
0.64 = medium
0.71 = large