Revised Teaching Observation Protocol (RTOP) (extracurricular elements if any)

- 255 classroom observation protocols
- Standards-based Teaching Evaluation System Standards and Benchmarks for Science Literacy

- Student-centered and inquiry-based

Teaching Science with Inquiry (TSI) instrument

- Designed to measure pre-service teachers’ self-efficacy in regards to teaching science as inquiry
- Based on Bandura’s work indicating that self-efficacy and beliefs strongly influence teaching practices

- The 5 essential features of inquiry-based instruction as defined by NSES

- Has also been used with in-service teachers participating in a Research-Experiences for Teachers (RET) program

Initial Predictions:

- Teachers participating in the Target Inquiry (TI) program will reform their teaching to be more aligned with NSES teaching standards, thus increasing their RTOP scores.

- Teachers implementing inquiry-based practices will have higher TSI scores, so as teachers RTOP scores go up so will their TSI scores.

Initial Findings:

- RTOP scores increased, but TSI scores decreased

Research Questions:

- Why is it that teachers’ RTOP scores increase, their TSI scores decrease?

- Can teacher interviews provide insight into the RTOP and TSI findings?

Table 1. Teachers Post-MA Interview Statements Regarding Inquiry Teaching

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Questioning / Reflection</th>
<th>Action</th>
<th>Content</th>
<th>Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 1</td>
<td>Not telling them what to do. I'm helping them to see where they're stuck and where the resources might be.</td>
<td>CHM 610: Inquiry oriented</td>
<td>CHM 610: Applic. to teaching</td>
<td>CHM 621: Active participation of students was encouraged &amp; valued</td>
</tr>
<tr>
<td>Teacher 2</td>
<td>Making sure they're on the right track as things go on.</td>
<td>CHM 630: Applic. to chemistry</td>
<td>CHM 630: Applic. to chemistry</td>
<td>CHM 640: Students design their own investigations &amp; gather evidence needed to answer a question.</td>
</tr>
</tbody>
</table>

Table 2. Teachers Post-MA Interview Statements Regarding Confidence in Inquiry Teaching

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Confidence during teaching and the activity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 1</td>
<td>There are a variety of resources and they are expected to use more than just me... before we were always at the lectern.</td>
</tr>
<tr>
<td>Teacher 2</td>
<td>My ability to coach students in the clear articulation of what they want to do...</td>
</tr>
</tbody>
</table>

Discussion

- RTOP results indicate that, as teachers progress through the TI program, their classroom instruction has become more inquiry-based.

- Teacher post-MA interview statements describing how their teaching had changed cited the following changes, which support higher RTOP scores:
  - Less teacher direction, more teacher questioning and guidance
  - Increased focus on conceptual understanding
  - More student independence and ownership of activities
  - More collaboration and communication between students

TSI Results

- Developed TSI scores, for the instrument as a whole as well as the Teacher Self-Efficacy (TE) and Outcome Expectancy (OE) subscales, support the idea that the teachers are less confident in their ability to use inquiry-based methods.

- Analysis of TSI items grouped by level of student self-direction (A) showed increases in all but the least self-directed items (D).

- Teacher interview statements, in general, indicated a greater confidence in abilities to design and facilitate inquiry, use of more inquiry-based instruction, and increased student independence.

TSI Reliability

- TIOP developers found increased TSI scores in pre-service teachers after an inquiry science methods course, attributed to the inquiry experiences in the course.

- Developers also indicated that reliability decreased from pre to post-administration, attributed to pre-service teachers’ realizations that inquiry instruction is much more complex than originally thought.

- Our data suggests that the TSI instrument may not provide valid and reliable data for in-service teachers in a long term professional development program, or that results in substantial changes to inquiry teaching practices.

Conclusion

- Teacher TSI ‘scores decrease because as they implement more inquiry, their student self-direction (A) decreases in all but the least self-directed items (D).

- Developers also indicated that reliability decreased from pre to post-administration, attributed to pre-service teachers’ realizations that inquiry instruction is much more complex than originally thought.

- Our data suggests that the TSI instrument may not provide valid and reliable data for in-service teachers in a long term professional development program, or that results in substantial changes to inquiry teaching practices.

Future Work

- Presenting teachers with the TSI instrument and asking them why they think their scores have gone down may help to integrate the TIOP into the participating in the TI program.

- A pre, post, post model where teachers complete the TSI before entering the program, after their first summer experience, but before trying to implement anything new in their classroom, and then after teaching a full year, may be a more useful way to understand these changes.

- Design a student questionnaire based on the TSI instrument items to compare student and teacher perceptions of instructional practices.

References


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