

## Summary and Analysis of CACHE Survey on Educational Material *by Juergen Hahn*

CACHE has conducted a survey of educators to determine which classes currently use non-traditional content delivery as well as where the largest needs are for developing non-traditional delivered content. In this regard, a survey consisting of seven questions was developed. 70 assistant and associate professors from 24 Chemical Engineering departments in the US were invited to submit responses to the survey. The survey was conducted anonymously as providing identifying information was optional. 25 responses were received and analyzed.

The respondents state that 80% of them currently use a traditional lecture format for content delivery while the remaining 20% use a flipped classroom model. When asked about the preferred content delivery option and equal number of responses were received for the traditional lecture format and a flipped classroom model (Figure 1). As such, there seems to be an interest in using a flipped classroom model if appropriate content is available.

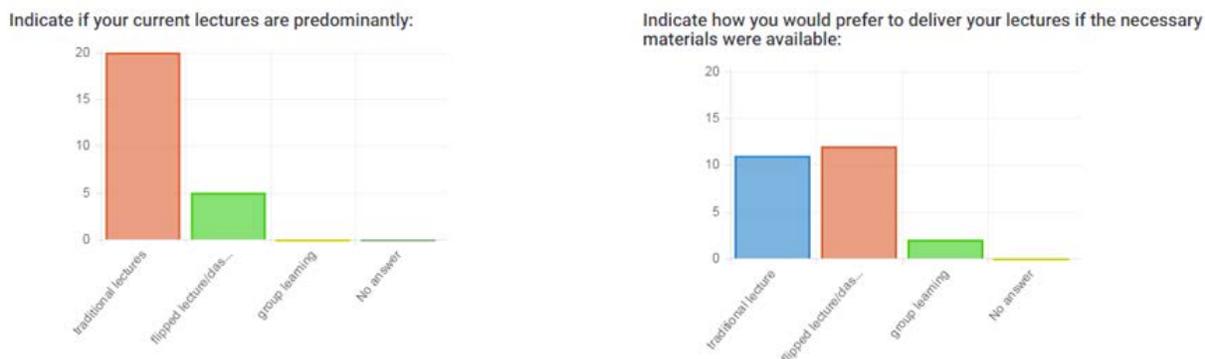
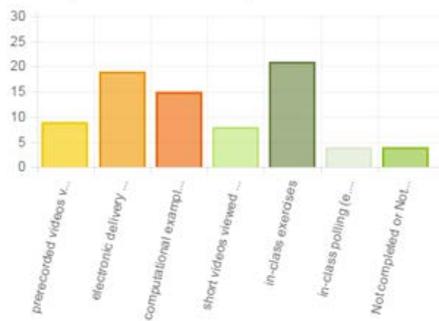


Figure 1: Current lecture format vs. desired lecture format

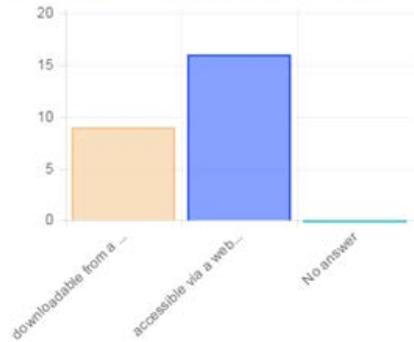
Participants were specifically asked what non-traditional elements they use in classes that they teach. Approximately 80% of respondents use in-class exercises and an equal number use electronic delivery of course content in the form of Powerpoint slides or similar delivery methods. Approximately 60% make use of computational examples and 40% use pre-recorded or YouTube videos to illustrate concepts. Only 10% use in-class polls such as via an i-clicker (Figure 2(a)). Furthermore, 2/3 of respondents indicate that they prefer electronic material that is accessible over a web browser over material that needs to be downloaded and installed on a laptop (Figure 2(b)).

Indicate if your lectures currently use:



(a)

What is your preferred method for content delivery?



(b)

Figure 2: (a) Use of non-traditional content delivery method in class; (b) preferred method for accessing content.

Two questions of the survey dealt with what classes respondents have taught in the last five years and which courses already use non-traditional delivery methods. The classes which use non-traditional delivery methods the most are Material and Energy Balances, Thermodynamics, and Modeling and Statistics, while Fluid Dynamics, Kinetics and Reaction Engineering, and Unit Operations/Separations make the least use (Figure 3). It should be noted that there was a mild correlation between the classes that respondents have taught and the classes that they know of that use non-traditional delivery methods.

Check the courses in your department that currently use non-traditional content delivery (e.g. prerecorded videos, in-class exercises, group learning):

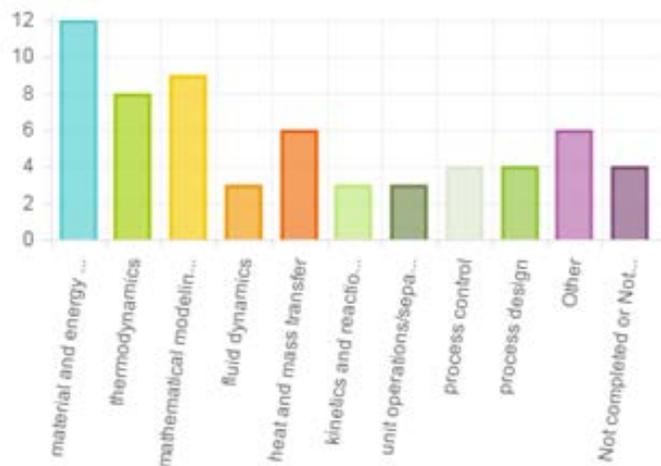


Figure 3: Use of non-traditional delivery methods in different classes.

The last question dealt with ranking classes that would benefit the most from having non-traditional delivery methods. Material and Energy Balances was named by 40% the class which would gain the

most, followed by Thermodynamics which was ranked second by 1/3 of respondents. On the other hand of the spectrum, half of all responses listed Process Design as the class that would benefit the least from non-traditional delivery methods. However, approximately 15% of responses listed Process Design among the classes that would benefit the most, i.e., there is no clear agreement on this issue (Figure 4). One general trend that can be extracted from the result is that classes that are taught earlier in a student's career seem to be listed as benefiting more from non-traditional delivery methods than classes intended for seniors.

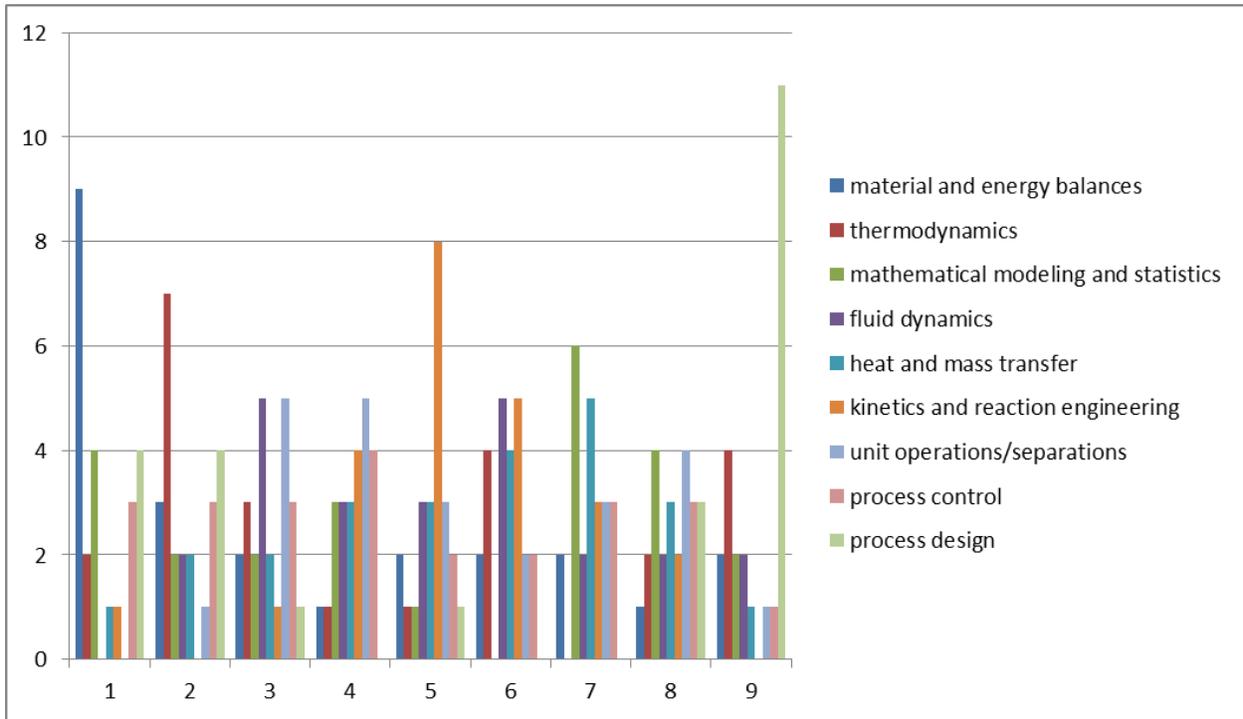


Figure 4: Rank of classes which would most (1) and least (9) benefit from using non-traditional content delivery.

The CACHE Task Force on Education thanks all respondents for their valuable input. The results from this survey will be used by CACHE to guide future development of educational material.