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## Auto-Grading for In-Class Flipped Classroom Exercises

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# Auto-Grading for In-Class Flipped Classroom Exercises

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## Automated Scoring for Practice Exercises

For technical courses like computer programming, in-class inverted classroom style, low stakes practice exercises have been shown to help student increase skills and build confidence with the material [1][2]. Performing such exercises in-class helps ensure immediate assistance (if needed).

One of the key challenges for the use of such in-class exercises is the overhead associated with scoring and returning such materials or worksheets. This can be a significant burden particularly for larger classes. When such exercises can be converted to multi-choice, an automated scoring system can be used. Conceptually similar to Scantron, the system uses standard paper and is scanned by existing UNLV copy machines. The system can present the questions in random order and/or the possible answers in random order. In this manner, every worksheet can be unique.

The **AutoMultipleChoice (AMC)** software will

- Read the scanned worksheets
- Create a scores spreadsheet
- E-mail an annotated copy of the worksheet to the student

Figure 1: Example question content of AMC Input File.

```
* According to Sheldon Copper, what is the [*best number*].
- 42
+ 73
- 1729
- NULL

* What is the color of Donald Ducks bowtie?
- Red
- White
- Blue
+ Yellow
```

### Worksheet Process:

- 1) Create Questions file (figure 1)
- 2) Process and Print Worksheets
- 3) Students Complete Worksheets (figure 2)

## Evidence it Benefits Students

In-class, low stakes exercises can help students better retain and understand course material by giving them the opportunity to apply what they have learned in a practical setting. Such in-class exercises can help keep students engaged and motivated by providing a more interactive and hands-on learning experience [3].

## How Others Can Adopt

The auto multiple choice system is software based, open source, and can be downloaded freely. Some technical expertise and administrator privileges are required for software installation. Reference:

- <https://www.auto-multiple-choice.net/index.en>

Figure 2: Example printed and completed worksheet (partial shown)

### Worksheet Process:

- 4) Worksheets are scanned (via UNLV copy machines)
- 5) Scans fed to AMC and scored
- 6) Scans are reviewed and any anomalies resolved

## References

- 1 Roop, P. M., & Bonham, S. A. (2016). The Flipped Classroom: A Review of the Literature. *Journal of College Teaching & Learning*, 13(1), 15-24.
- 2 Kupczynski, L., & Graham, C. R. (2015). Flipping for Success: A Meta-Analysis of the Flipped Classroom. *Journal of Computing in Higher Education*, 27(2), 125-147.
- 3 Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment. *The Journal of Economic Education*, 31(1), 30-43.

Figure 3: Example annotated worksheet (partial shown)

**Note, this is the image that is automatically emailed to students by the AMC system.**

### Worksheet Process:

- 6) Scores spreadsheet downloaded (and, if desired, uploaded into Canvas)
- 7) Annotated worksheets e-mailed to students

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