

Functional measurement of a supplementary teaching system based on augmented reality technology for the course “building mechanical services and utilities” in architecture

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Abstract

This applied study with quantitative research method aims to enhance the efficiency of common visits in technical courses of architecture using a tool based on augmented reality technology. This tool provides students with the supplementary information on a field visit to teach the course “building mechanical services and utilities” in form of virtual components combined with the real world. The results of application of this tool in an experimental group (38 samples) and comparison with the control group (35 samples) through pre-test, post-test and surveys show that this supplementary teaching tool contributes to enhance the students’ learning through the field visits and it is more effective than field visits in order to provide the satisfaction of learning approach and higher scientific validity from the students’ point of view.

Table 2. Covariance analysis of post-test (resource: authors)

| Variable | | N | Mean | SD | Std. error | F value | P | D |
|-----------|--------------------|----|-------|------|------------|---------|-------|-----|
| Post-test | Experimental group | 38 | 16.32 | 2.69 | 0.43 | 10.69 | 0.022 | .70 |
| | Control group | 35 | 14.77 | 2.94 | 0.49 | | | |

Table 1. Results of questionnaires (resource: authors)

| Dimension | Group | N | Mean | Std. Deviation | Std. Error Mean | T | P | |
|-----------------------|--------------------|--------------|------|----------------|-----------------|------|-------|-----|
| Learning attitude | Pre-questionnaire | experimental | 38 | 15.02 | 4.72 | .77 | -1.76 | .08 |
| | | control | 35 | 16.91 | 4.37 | .74 | | |
| | Post-questionnaire | experimental | 38 | 26.18 | 5.85 | .95 | -.20 | .84 |
| | | control | 35 | 26.49 | 7.03 | 1.19 | | |
| Satisfaction | | experimental | 38 | 44.58 | 12.12 | 1.97 | 5.06 | .00 |
| | | control | 35 | 30.83 | 11.00 | 1.86 | | |
| Cognitive reliability | | experimental | 38 | 30.05 | 10.08 | 1.63 | 3.93 | .00 |
| | | control | 35 | 21.80 | 7.59 | 1.28 | | |

Conclusion

The results of comparison of students’ scores after the field visit showed that, despite the progress of both groups versus the pre-test, the group which experienced the augmented reality (AR)-based field visit scored better in the post-test. The learning attitude of both groups towards the importance of learning about building mechanical services and utilities, which did not differ significantly in the pre-questionnaire, was promoted in the post-questionnaire but no considerable difference was still observed between the groups. For the satisfaction with learning approach, however, the experimental group was far more satisfied with the learning approach than the control group. According to the students’ attitudes, the cognitive validity of activity designed for the experimental group was greater than that of the activity designed for the control group.