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Social Media + Parallel Prototyping

A Light Fixture Classroom Approach

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Context & Method

Context

In design classrooms, to accomplish a creative goal, students execute design heuristics that possibly lead to desirable outcomes. Interactions between their actions and the reality might either reinforce initial assumptions or urge prospective improvisations. This cycle is called *making-finding* (Koutstaal & Binks, 2015). While instructors' feedback serves as a hypothesized reality, students practice *parallel prototyping* – creating multiple solutions per feedback cycle (Dow et al., 2010), to ensure their initiatives in the making-finding cycle.

Social media, with its instant and interactive nature, is perfect for evaluating and giving feedback in the parallel prototyping process (Fig.1). Positive correlations were also found between the intention to use social media and academic performance (.756, $p < .01$) (Al-Rahmi et al., 2015). Based on this potential fit, the authors conducted a mixed-method study in a light fixture design classroom at the University of Minnesota in three consecutive years (2015 to 2017). The main hypotheses are:

H1: *Social media interaction increase students' engagement with feedback.*

H2: *Feedback engagement predicts students' performance.*

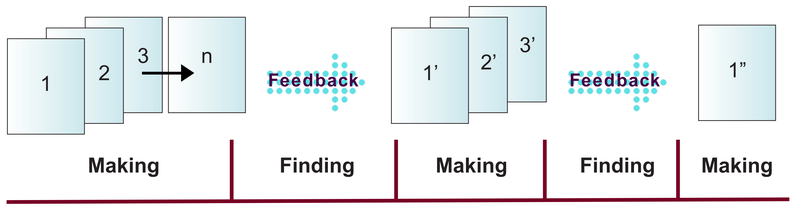

Figure 1. The making-finding cycle of parallel prototyping in design classrooms. Having multiple solutions per feedback intervention ensures a sucessful outcome. Image courtesy of authors.

Method

In collaboration with a Texas-based furniture and fixture manufacturer, students created light fixtures and received feedback from the chief executive officer (CEO). On a private Facebook group, students posted 15 sketches to the folders with their names (Fig.2). Once CEO provided informative feedback on each sketch, students could instantly access to this resource to revise and enhance their ideas. Students then uploaded 3 idea developments and the feedback cycle started again. Students scale models, went on display at a renowned trade show where attendees voted for the most creative and profitable solutions (Asojo, 2013).

We collected and analyzed data from 2015 to 2017 (N = 75). For student performance, we used a *5-point scale* rubric (*poor—excellent*) on each component: *conceptual drawings* (15 sketches), *concept statement*, *dimension drawings*, *material selection*, *axonometric*, *model craftsmanship*, and *board layout*. We adapted a *4-point scale* (*none—a lot*) to assess interaction frequency and infer engagement (Oygur & McCoy, 2011).

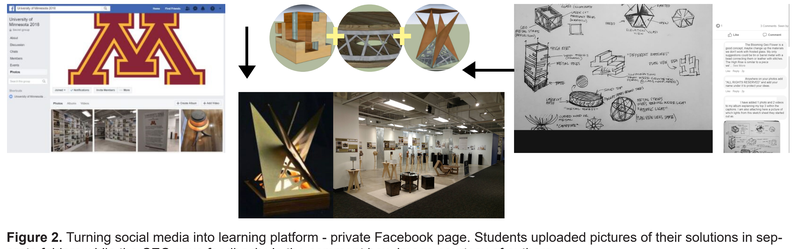

Figure 2. Turning social media into learning platform - private Facebook page. Students uploaded pictures of their solutions in separate folders while the CEO gave feedback via the comment box. Image courtesy of authors.

Findings

H1: Social Media Interaction and Feedback Engagement

Social media interaction in students referred to the frequency in posting materials and responding to the CEO comments. The frequency spanned across the scale with 20% none (14), 17% a little (13), 28% some (21), and 35% a lot (26). Authors, via qualitative analysis of the comment content, coded the interaction frequency into three levels of feedback engagement: *strong* (26%), *moderate* (38%), or *disengage* (20%). Descriptive statistics and Nvivo analysis showed that higher social media interaction led to higher engagement. Except for 2015, the other classrooms shared similar engagement patterns (Fig. 3). The content focused on *novelty*, *feasibility*, and *potency* of student solutions (Fig. 4). Insignificant signs of emotion-latent content. Unrelated comments were excluded from the data.

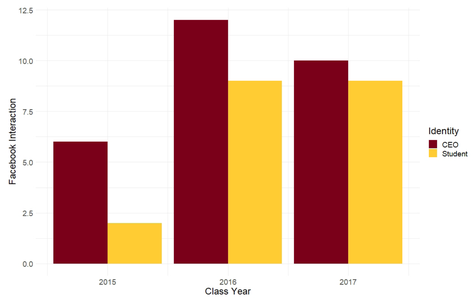

Figure 3. Social Media (Facebook) interaction in the three consecutive classrooms (2015 - 2017). Diagram created by authors.

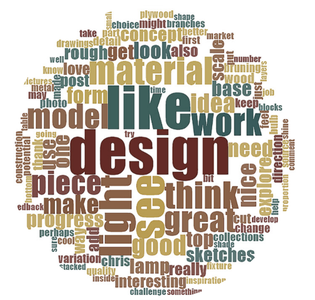

Figure 4. Word cloud of the qualitative analysis of comments. Diagram created by authors.

H2: Feedback Engagement and Student Performance

While feedback engagement scattered on the 4-point scale, student performance clustered on the higher side of the 5-point scale (good—excellent). Authors cut off the scale at 2 and divided the students into the *low* (0-1) and *high* (2-3) *engagement* groups. Given a confidence level of 5% ($\alpha = 0.05$), the randomization test for student performance revealed a significant difference between the low and high feedback engagement groups with a p-value of 0.0037 (< 0.05) (Fig. 5). Supporting evidence also derived from the trade show voting. Across three classes, students who won the 1st (5), 2nd (1), and 3rd (3) place at the High Point marketplace exhibition all belonged to the high engagement group.

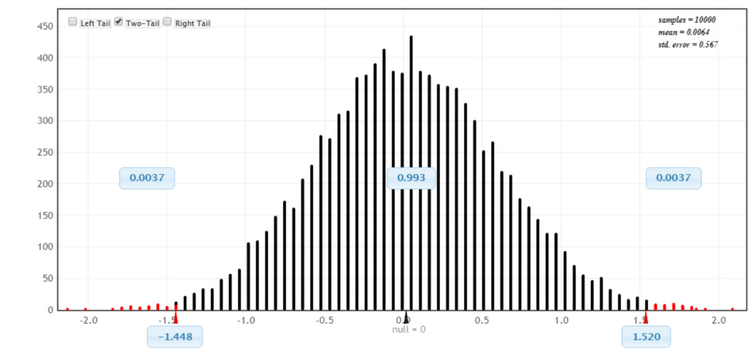

Figure 5. Randomization for the difference(s) in mean of student performance between the low and high engagement groups. The two-tail cut off show a significant p-value of 0.0037. Diagram created by authors.

Discussion

General Discussion

The findings supported the positive correlation between social media interaction and student performance found in the literature. However, instead of causal evidence, it was only a statistical trend.Beside 62.6% of students who were high in both engagement and performance, there was 37.4% of students who did well even in the low engagement group. There were even outliers with minimal engagement yet had decent performance (Fig. 6). However, the percentages of students who were high in both engagment and performance doubled their counterparts. It was possible that students with low engagement used different strategies to support the making-finding cycle such as external mentors, extra working time, etc. Using more raters with high inter-rater reliability can increase the objectivity in assessing performance and thus, will shed light on the relationship between social media and learning.

Limitation and Future Research

With a low chance of 0.37% to account the performance difference of 2 groups for randomness alone, in this sample, feedback engagement via social media projected positive impacts on student performance. As the sample only included interior design undergraduates from one land-grant university, to establish causational claims, the authors need to access the student population of other local institutions. Also, the categorical codings of social media (Facebook) interaction/ feedback engagement limited the statistical power in the quantitative approach of this research. Hence, in future works, the authors will consider interaction frequency as numeric values and engagement level as a relative comparison between students. This change will allow the use of linear regression and provide impactful inferences to the population.

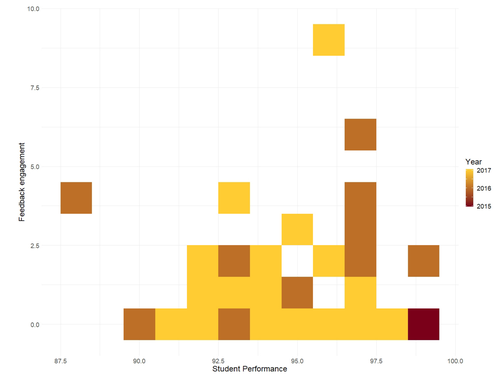

Figure 6. Distribution of feedback engagement and student performance across classrooms (2015 to 2017). Most values were vigorous in performance with moderate to high engagement. Diagram created by authors.

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