THINKING BEYOND NUMBERS: STUDENT'S PERCEPTIONS OF COMMUNICATING STATISTICS THROUGH THE ARTS

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INTRODUCTION

One of the main learning goals in teaching statistics is to develop competencies in communicating statistical information. Statistics education needs to develop learners' statistical literacy so that learners can ask where the statistics came from, how they were assembled, why they were being gathered, and how much they can be trusted. However, educators often face challenges when teaching introductory statistics to learners with a math phobia. Students' low self-efficacy beliefs about mathematics can prevent them from fully engaging with the course materials and developing deep understanding of mathematical and statistical concepts. Research in statistics education advocates, with some empirical findings, that engaging statistics students through the arts can help them overcome math phobia and make learning statistics more meaningful and memorable.

ARTS-INTEGRATED PEDAGOGY

We have experimented with different approaches to incorporate arts in statistical teaching. In an introductory statistics course, we encouraged students to think beyond numbers and use artistic approaches of their choice to convey important statistical information when they grapple with data. Students' arts-based integrations included paintings, drawings, sculptures, 3-D models, embroideries, songs, poems, videos, comedy skits, improvisations, infographics, mind maps, and concept maps. In one actuarial and finance course, every seminar opened with an actuarial "puzzle" from a media source such as a film clip, a TV talk show, a stage play, to motivate students in discussions on quantitative and qualitative aspects of the puzzle. In an insurance mathematics course, we used narrative math and theatre to tie all the math topics together into an obstacle course for students to navigate using their newly acquired knowledge. We often deployed creative artmaking as part of the active learning assignments, giving students the opportunity to use artistic means of their choice to convey topics in the course, as well as to present lightning talks and communicate the connection between their arts and the technical topics.

STUDENTS' PERCEPTIONS

In an introductory statistics course, we studied students' perceptions of statistics when enabling them to incorporate arts-based elements into the subject matter. Our analysis of qualitative data revealed that students' inspiration to mix arts with statistics stemmed from their personal interest or experience, or their motivation to comprehend or strengthen their understandings of statistical concepts that they tend to struggle with in the course. These identified difficult topics by students include the comprehension of lurking variables, conditional probability distributions, and multivariate associations. Some students asserted that communicating statistics through visual arts helps make statistics more digestible, engaging, and relatable, and, in turn, can educate readers about the context and the story behind the data. Moreover, our analysis of quantitative data revealed that the incorporation of arts-based elements into statistics will on average induce students' positive attitudes towards learning, as well as facilitate more effective statistical communications.

CONCLUSION

In conclusion, our practices and studies show that arts-integrated pedagogy can foster inclusive pedagogy by promoting students' creativity and imagination and their openness to learning. It helps develop their communication skills in statistics and remove barriers for learners who struggle to make sense of statistical information.

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