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"Post-it mapping": analogical disruption in the classroom

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Abstract

Educators need to prepare students for an increasingly complex andinterconnected world, and traditional teaching methods can fail to help students develop some of the needed skills. We set up to combine flipped-calssroom strategies and mapping techniques with the aim to encourage creativity and adaptability while ensuring deep learning of complex theoretical concepts. A simple analogical disruption was added, in the shape of post-it notes used to build concept maps, to disturb an otherwise heavy technology-based course. Our teachinginnovation has been pilot tested in a range of groups and theoretical concepts with preliminary positive feedback being reported by students. They have described the innovation as "an entertaining change", but also referring to improvements on their information searching and critical thinking skills. Students also found that the analogical mapping activity through post-it notes encouraged participation and an active attitude in class. Overall, they reported an improved understading of complex concepts and to their independent learning skills, which appears to support the literature linking visual representations and summary exercises with high student satisfaction and improvements in meaningful learning.

Keywords: *concept map; analogical disruption, critical thinking; flipped classroom; creativity; business education.*

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1. Introduction

The current ever-changing global economy demands Higher Education institutions to add a wide range of adaptation-building skills to the specific competences needed in professional fields. Educators in general, and those in business-related fields in particular, need to prepare students for an increasingly complex and interconnected world. It has been shown that traditional methods fail to help students develop some of these essential skills, and the need to adapt teaching methods accordingly has been widely discussed (Juaneda, 2019).

In such context, we have been investigating new approaches to teaching complex theoretical concepts in business-related courses. We had previous experience adapting flipped-classroom strategies in our courses' toolkit, where instructors act as advisers, experts, facilitators or supervisors, depending on the needs. We had also occasionally applied different types of mapping techniques as visual aids to assist deep learning for elaborated concepts (see below). Lastly, we set up to combine both approaches adding a specific characteristic that we thought might be relevant in the current teaching environment ominated by Information Technologies: an analogical disruption. We attempted this by swapping software-based mapping with an analogical version using post-it notes, trying to encourage creativity and adaptability to limited resources. Our aim was to disrupt the classroom with a handmade activity that will alter the static and low participation we sometimes find associated with computer-based teaching.

1.1. Concept maps and analogical disruption

We initially set up to work with Novakian concept mapping (Novak & Cañas, 2006) as a tool to display complex information visually, including the possibility to add structured concept associations amongst statements/propositions (connective terms and labelled linking lines). The main benefit of concept maps has been described as turning hidden implicit concepts into externally explicit structures (Albherg, 2013). Our aim was to visually hierarchize relationships between elements, considered building blocks of complex theoretical concepts. However, we prioritized flexible organization of ideas and discussion of concepts over formal aspects of the finalized maps, so the students' creations might loosely resemble classical concept maps.

Most mapping techniques present a common goal: to promote "deep" and not "surface" learning and encourage independent learning (Svinicki, 2004). Also, most students find it easier to follow maps than verbal/written descriptions, and map-making has been shown to require more active engagement improving learning outcomes (Albherg, 2013). This is due to the dual coding process involved in the mapping process: verbal (propositional form) as well as pictorical (visual). Some disadvantages have also been reported, such as the need for some training, idiosyncratic designs and lower than expected memorability in complex cases (Davies, 2011).

Nowadays, formal visual representation of difficult theoretical statements can be greatly facilitated with the use of information and computer technology, and computer-assisted mapping has been shown to be effective to teach and develop critical thinking skills (Clarke et al., 2006). On the other hand, old-fashioned "crafty" methods can be used to disrupt heavy technology-based classrooms in unexpected ways (Coker & Whalen, 2019). We thought that the extra manipulation and physical activity involved when working with analogical tools and presentations, could improve student attention, focus and retention (Haapala, 2012). In this regard, post-it notes are inexpensive, widely available and could take part on a variety of educational dynamics with little preparation, such as brainstorming or creative visual activities. The fact that they are colour-coded and can be found in a variety of sizes and shapes makes them especially suited for categorization and mind-organization activities, such as creating concept maps.

1.2. Creativity and learning styles

One of the key tasks for educators in business-related programs is to prepare learners to be capable of participating creatively in an innovation economy. Therefore, teaching innovations should require the strengthening of individual and group thinking to define, produce and select creative ideas. Creativity can be understood as the ability to challenge assumptions, make connections and finding new solutions (De Bono, 1995), and in the current innovative society success depends as much on competitiveness as it does on creative problem solving. Maps can be considered among a range of teaching techniques useful to build creativity: they can assist with problem definition, idea generation, decomposing and analysis,
and require brainstorming, which in turn improves idea formation, especially in a group setting. Another factor to take in consideration is the reported shortage of critical thinking skills in business-related curricula (Jance & Morgan, 2013). And mapping techniques have been shown to improve these highly sought-after skills (Kunsch, 2014).

Support of the various students' learning styles is paramount for an effective business-related education, and instructors are required to use innovative techniques that cater for this diversity of learning styles. Visual learners remember pictures and diagrams best, while verbal learners prefer written or spoken words. In this context, maps and concept diagrams are valid methods to reach the visual learner who has been traditionally overlooked in higher education (Clarke III et al., 2006). Furthermore, all these factors are especially relevant to teach today's "Net Generation" learners, who process information in a randomized or networked pattern, which makes them especially suited to building concept maps (Matulich, 2008).

1.3. Objectives

This paper aims to present a teaching innovation we have applied to different scenarios and tested at a pilot stage. The internal feedback received from students and our own experience after years teaching similar concepts, has made us decide to set up a research project to evaluate this innovation during the next semester (fall 2020) with at least 4 groups of students to systematically assess their satisfaction and compare perceived learning outcomes. We think Head20 could be the perfect environment to discuss and refine our innovation.

2. Teaching intervention

Motivated by the twin goals of using active learning and responsiveness to a diversity of learning styles to enhance learning, we decided to use concept mapping as a creative problem-solving activity to teach different theoretical concepts composed of various items or phases (e.g.: market research design, product development, macroenvironment or web analytics 2.0). We have so far used this approach to teach 2nd and 3rd year undergraduate marketing students (4 years degree), gender and age ranges showed in table 1, in a range of different modules (e.g.: market research, strategic marketing, fundamentals of marketing, product management, etc.), all entitled to continuous assessment, what means completing a final exam (60%), group coursework (25%). The main learning objects for the intervention were, apart from those related to the assimilation of the specific theoretical concept being taught, to improve students' information searching skills and to increase critical thinking capacity towards selection and integration of complex ideas. The intervention was divided into four steps: online information search, assessment and summary of information, presentation of results in map format, and feedback. The time frame was set to five sessions,120 minutes each,working with groups of around 25 students (smaller groups should require less time).

Table 1. Distribution of student by gender and age group.

Ages	Men	Women	Total
17-19	15,8%	28,1%	20,2%
20-22	71,9%	56,3%	66,3%
23 or more	12,3%	15,6%	13,5%
Total	64,0%	36,0%	100,0%

Source: own elaboration

2.1. Session 1: Instructions and information search

The instructions were presented to the students, including the number of sessions, steps involved and the main goals and learning objects of the activity. Students were provided with access to the internet, a board, post-it notes and markers. The theoretical concept was then briefly introduced by the instructor, and the students allowed to search for initial information on the topic online. The aim during this session was to find key definitions and identify the main items/components related to the theoretical concept.

2.2. Session 2: Further in-depth information search

The second session started with a quick overview by the instructor on the topic, reviewing the key definitions and the main items/components as found in the previous session (we would recommend working with four to seven components).

Figure 1. Initial overview presented by instructor at the beginning of session 2, based on the main items/components found during session 1.

An example of such overview can be seen in Figure 1. Then students were asked to each choose a component and proceed with a deeper information search (ensuring all components were searched by at least three or four students).

The instructor guided the students to ensure appropriate information was collated by suggesting four generic questions to answer: What is it?; What is its main purpose?; What tools?; What Key Performance Indicators? The instructor refined the questions according to the specific theoretical concept being researched in each occasion.

2.3. Session 3: Critical assessment and post-it notes summarization

In this session students needed to critically assess the information collected in the previous session, individually, and organize it and summarize it using post-it notes. Post-it notes were colour-coded according to the different components being analyzed. The aim was for students to focus on meaningful ideas, but they were not constrained in the format to do so (text, keywords, drawings, etc.) to spur their creativity. Students were also encouraged to use links or connectors between notes if they felt the need to do so.

2.4. Session 4: Mapping and in-class presentation

Session four involved the presentation by students of each component to the rest of the class. First all students researching the same component worked together tocompare and discuss their individual work. They need to reach a consensus about the information to be presented to the class and rearrange their notes accordingly (or create new ones as needed). Each team was then asked to create a post-it "branch", for the general concept map, on the specific component they had researched. Then, one team at a time, students stick their part of the map in the class board and presented their findings to the class (see Figure 2).

Figure 2. Example of in-class presentations during session 4 showing several post-in "branches"(colour-coded) of the finalized concept map.

2.5. Session 5: Feedback

During the last session, the instructor asked students to provide feedback on each team's presentation. They were asked to focus in constructive criticism pointing to unclear concepts or ideas, potential improvements and further illustrativeexamples. Any correction suggested

by the students had to be previouslyresearched and referenced accordingly (to prove solidity of the evidence). The final session ended with a summary and recap by the instructor, reviewing all relevant topics, strengthening the main components needed for a deep understanding of the proposed theoretical concept and validating the students' work.

3. Students reactions and future work

We have not been able to objectively measure the effectiveness of this teaching innovation, but we have consistently asked students about their feedback relatingtheir impressions about the activity. Students were always asked to answer twoopen questions at the end of the final session: Did you like or dislike the activity? Did the activity improve or enrich your learning experience in any way?

In general, students had reported high levels of satisfaction with the mapping activity, labelling it as "entertaining" and "a new change". Regarding their learning experiences, students reported an improvement in their searching skills (especially the flipped-classroom idea that active information search improves retention) and they found the mapping activity encouraged participation and an active attitude in class. They also reported improvements to their teamwork abilities, arguing the need to listen to classmates and keep an open minded to select the best contributions for the map. Especially competitive students found the activity very engaging, as it encouraged them to work harder to be "proud of your own work being presented to the class". An unexpected outcome was the repeated reference to the improvement of individual information searching skills by students, who reported this helped them improve their understanding of complex concepts and even the quality of their final presentations. This fact reinforces the idea that current undergraduate students benefit greatly from flipped classroom approaches,as it encourages independent learning and critical thinking skills, which might belacking in traditional teaching approaches.

The educational literature has for long reported that meaningful engagement is a critical factor in promoting deep learning (Davies, 2011).

Several studies have found that visual representations and summaries are especially effective improving academic success and providing high student satisfaction (Clarke et al., 2006). Similarly, measurable improvements in meaningful learning having reported using concept mapping under test conditions with control groups (Hay et al., 2008), which is what we have set to evaluate for the next semester. This ads support to the idea than concept mapping promotes meaningful learning, and we hope that its combination with analogical disruptors and a flipped classroom approach would prove to be a successful combination to add adaptability and creativity skills into our courses' curricula.

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