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Nuevos enfoques en la Innovación Docente Universitaria

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Estimados lectores,

Como presidente del Teaching and Learning Inovation Institute es un placer para mí presentar los resultados de las ponencias que fueron presentadas en el III Congreso de Innovación Docente Universitaria celebrado en León, los días 19 y 20 de octubre de 2017 en la Facultad de Ciencias Económicas y Empresariales.

Como siempre, las sesiones han sido muy productivas queriendo destacar, no sólo la calidad de las ponencias presentadas, sino también la enriquecedora aportación que se ha hecho desde muchos campos académicos: ingenierías, económicas, historia, veterinaria, arte y patrimonio. Esta rica contribución significa que nuestro congreso polariza la atención de profesorado de muy distinta naturaleza interesada en compartir con la comunidad de innovadores docentes sus descubrimientos, estudios y experiencias.

El presente libro es el resultado de las aportaciones de los participantes en el III Congreso. Esperamos que sean del interés de todos aquellos interesados en la innovación docente. A quienes no habéis participado nunca en nuestro congreso os animamos a hacerlo en próximas ediciones.

Un saludo,

Nuria G. Rabanal
Presidente de TeLeIn2

Diseño de Aula
Classroom Design

Overview – En este artículo se analizan las estrategias activas de enseñanza y aprendizaje. Se explica cómo el diseño de los espacios de aprendizaje puede apoyar la colaboración entre los estudiantes, así como entre la profesorado y los estudiantes, y específicamente se discute el diseño del aula de escalada en el aula. A continuación, se comparan las tasas de utilización de las salas de dos aulas Scale-Up con grandes mesas redondas en la universidad de autores a otras aulas diseñadas para una pedagogía de conferencias. Finalmente, se analizan los resultados de una encuesta de profesorado en las aulas Scale-Up para discernir los pensamientos de los profesores acerca del diseño y si apoya su pedagogía.

Keywords: Aprendizaje comprometido, diseño de aula, tecnología, colaboración

Abstract – This paper discusses active classroom teaching and learning strategies. It explains how the design of learning spaces can support collaboration between students as well as between faculty and students, and specifically discusses the Scale-Up classroom design. The paper then compares room utilization rates of two Scale-Up classrooms with large round tables at the authors' college to other classrooms designed for a lecture pedagogy. Finally, it analyzes the results of a faculty survey on the Scale-Up classrooms to discern the sentiments of faculty members' concerning the design, and if it supports their pedagogy.

Keywords: engaged learning, classroom design, technology, collaboration

1. INTRODUCTION

Traditionally, communication in a higher education classroom flowed from the instructor to the student, often in a lecture stadium with tiered seating. More recently, however, instruction supports more of a two-way communication between instructor and student, as well among students.

The popularity of "flipped classroom" pedagogy confirms this observation. A flipped classroom refers to an inverted approach in which teaching and learning responsibilities are inverted; that is, students listen to a lecture and do homework prior to the class meeting, and then practice what they learned during class (Lage, Platt & Treglia, 2000; Herreid & Schiller, 2013). Instead of lecturing to the entire class, instructors engage students one-on-one or in small groups (Sams & Bergmann, 2013). Flipped classrooms in higher education tend to have a positive influence students' motivation, engagement and total achievement, as well as students' creativity, a higher-order thinking skill (Al-Zahrani. 2015).

Constructivist theory also is critical of the lecture approach, favoring a more student-centered approach with the professor functioning more like a guide on the side instead of a sage on the stage (King, 1993). Constructivists consider learning to be an active process, in which learners construct an interpretation of meaning based upon their experiences (DeVries, 1990). Constructive interaction with instructors and peers is a critical factor in achieving higher order

thinking because learning is a social activity (Huff & Cruz, 2013).

This paper discusses active learning strategies that embrace social interaction. It further relates how classroom design supports active learning pedagogies such as those endorsed by a flipped classroom approach and by constructivists. It then describes the renovation of two classroom spaces at a university, and the faculty's response to the alterations. Finally, the paper concludes that faculty view tables as supporting collaborative work by groups of students; however, that style of furniture may not support other teaching styles. Therefore, smaller tables, which can be arranged either in rows for lectures or in clusters for group work, may be a more viable option for classroom design.
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2. CONTEXT

Learners processes new information in an active manner, with the learner "sensing, acting, and thinking" (Glasersfeld, 1991). Constructivism focuses on activities that place the responsibility of gaining knowledge on the learner. Constructivist learning is a dynamic process where learners are constructing their own knowledge by interacting with real-world experiences, their peers and their instructor (Johnson, 2009).

Group work often is a part of a constructivist classroom because interaction with peers deepens the

learning process and exposes students to the concept that peers, as well as the professor, are resources (Schweitzer & Stephenson, 2008). Group work and interaction with the instructor supports the social aspect of learning in the constructivist classroom because peers and professors assist the learner and enhance the knowledge-building process (Powell & Kalina, 2009). As a result, the construction of knowledge frequently is a cooperative learning experience (Perkins, 1999). Group work allows a student to observe how others learn and participate in another's thinking process (Windschitl, 1999). In an active learning process, students learn to think for themselves with less instruction from the professor, to express their ideas, and to revise their knowledge as more information is introduced (Airasian & Walsh, 1997). Further, team-based learning is an effective way to structure a flipped classroom environment, using a process by which students prepare before class to work in teams during class to complete application exercises in teams. (Jakobsen & Knetemann, 2017).

Other social learning theories such as collaborative learning, situational learning, and team-based learning recognize the classroom as "a collective, cohesive social space in which interaction can be managed and cultivated" as well (Cruz & Huff, 2013). Best practices for teaching and learning in higher education include student–faculty contact, cooperation among students, and active learning (Chickering and Gamson, 1991). Although classroom design can be a catalyst for change, pedagogical alterations to encourage engaged learning will not reap their optimal effectiveness if the classroom structure is not conducive to flexibility and innovation (Cullen, Harris & Hill, 2012). Studies of teaching assistants demonstrated that different configurations of the classroom either enhanced or limited their ability to apply different teaching strategies, and affected the students' ability to enact with different learning strategies as well, with flexible spaces having a more positive effect on teaching and learning (Chen, Leger & Riel, 2016). Classroom design should support active learning activities and facilitate collaboration (Finkelstein, Tovar, Ferris & Weston, 2013).

The arrangement of furniture in a learning space affects the flow of communication and the expectations of learners. For example, students in rows with the professor at the front of the room 1) establishes one-directional communication, 2) limits and discourages student interaction, 3) sends a message about control, and 4) creates a norm for students to be more passive and anonymous (Cullen, Harris & Hill, 2012). There is an increasing recognition of a connection between learning theory and space design (Huff & Cruz, 2013). Spaces that are conducive to learning are 1) adaptable, supporting a multitude of learning and teaching styles; 2) social, supporting collaboration, interaction, and engagement; 3) healthful, promoting the safety and physical wellbeing of students, faculty, and staff; 4) sustainable, demonstrating environmental responsibility; 5) resourceful, supporting long-term efficiency and use of assets; and 6) stimulating, sparking creative thinking (Grummon, 2009).

Spaces that are most effective for active and collaborative learning create a flexible and fluid environment, such as a class structure that begins with a short lecture or instruction followed by group activities, presentations and discussions (Dittoe & Porter, 2007). The use of tables instead of individual desks encourages social interactions between students, and between students and the instructor, which leverages the relationship-building capability of people (Gaffney, Richards, Kustusch, Ding & Belchner, 2010). Round tables allow for group interaction, while whiteboards along the walls can provide a public thinking space (Beichner, 2015). One study found that learning spaces in which tables of students are grouped, instead of being arranged in rows facing the front of the classroom, produce a higher frequency of student-led discussion and a lower frequency of instructor-led discussion, suggesting that classroom design can positively impact student collaboration and make teaching more interactive (Jorion, Taeyaerts & Jeanes, 2016). Interestingly, another study suggests that the use of round tables also tends to eliminate the observed phenomenon in lecture halls for high performing students to congregate in the front of the room (Kregenow, Rogers & Price, 2011).

After examining the current trends in learning space design at peer institutions, a committee at Princeton University made several recommendations. The committee recommended that 1) rooms be furnished with flexible furniture, 2) tables, which accommodate two students, be combinable with others to create small-group work spaces and larger assemblies for class discussions, 3) chairs have wheels and storage for bags, and 4) multiple flat-screen monitors for student groups to share for collaboration and presentation (Wulsin, 2013).

The use of technology also enhances learning spaces. Fusing technology with classroom elements such as furnishings, lighting, and writing surfaces while incorporating the use of laptops and mobile devices, common tools of contemporary students, can result in a dynamic active learning environment (Garrett, 2014). The proper marriage of space technology and

pedagogy can help achieve learning outcomes, facilitate learning and ensure learner success (Oblinger, 2006). One study revealed that students taking a course in a technologically enhanced environment conducive to active learning techniques outperformed their peers, who were taking the same course in a more traditional classroom setting, suggesting that learning environments enhance by technology have a significant and positive impact on student-learning (Brooks, 2010).

3. DESCRIPTION

SCALE-UP is an acronym for *Student-Centred Active Learning Environment with Upside-down Pedagogies*. The Scale-Up classroom design, with its accompanying pedagogies, was developed in heavily enrolled science courses at a U.S. state university (Gaffney, Richards, Kustusch, Ding & Belchner, 2008). Nine students typically are seated at round tables wherein teams of three are given something to investigate, and have a laptop for Internet access to seek information or to load responses (Figure 1). The social interactions between students, and between students and the instructor, who roams the classroom, asking and answering questions, converge to encourage students to engage in the process of learning. Over one hundred-fifty institutions have adopted this format for classroom instruction, including science as business, geography and foreign languages (Van Horne, Murniati, Gaffney & Jesse (2012). There are twelve Scale-Up classrooms at universities in Europe, including one in Spain at Universidad Politécnica de Madrid (Scale- Up, 2017).

Figure 1 Author's classroom

If feasible, the room should have two ceiling-mounted computer projectors at opposite ends of the room near the ceiling because, with round tables, half the class is facing the opposite way if the professor is using a computer connection to deliver preparatory content or

review responses. Students should be identifiable with either nametags or tent cards. Comfortable rolling chairs with no arms allow students to sit close together to collaborate, and chairs with a mesh bottom are thinner, giving the instructor more room to move between tables when responding to inquiries (Scale-Up, 2017).

In fall semester of 2011 the author's college completed the expansion and renovation of one classroom in its assigned building to be a Scale-Up room that seated 99 students (eleven tables). That semester the college also debuted a second Scale-Up classroom, after modifying its egress, which seated 63 students (seven tables). In fall of 2014, the administration sent a preliminary feedback form to faculty who had taught in the rooms to inquire about the functionality of the spaces and their furniture configuration. Based upon the qualitative feedback from faculty, the authors developed a more detailed survey in 2017 to gather information from a broader audience of faculty members regarding the functionality of the rooms and their furnishings. Because faculty may request the specific attribute of round tables when room assignments are made, the room utilization data also were evaluated to examine indirectly the popularity of the rooms' attributes by looking at demand.

4. RESULTS

A. Room Utilization

First, the authors examined the room utilization rate for the blocks of time during the week in which courses were scheduled in the rooms. Two distinct classrooms were combined into one room in one case, and in the other case, the seating capacity of the room was expanded by the addition of a door. Therefore, comparison to pre-renovation rates was not a relevant indicator of an increase or decrease in demand in response to the change from individual desks to round 9-top tables in the individual rooms. As a result, the authors compared the rate for the two rooms to the general utilization rate of classrooms across the entire university in the year the rooms were renovated.

The number of time blocks utilized over the available time blocks (utilization rate) for the Scale-Up rooms ranged from 64-75% in the time blocks during the day, and from 32-43% for night classes, with a total rounded average of about 53-54%. Comparatively, the overall utilization rate for general classrooms was 66.2%. This result suggests that the Scale-Up rooms were utilized less than general pool classrooms. However, the classroom size and seating metrics can affect demand substantially, and these two renovated

classrooms are among those having the largest seating capacity in the university. Generally, the demand for classrooms that exceed the average class size would be expected to be less than for rooms of average class size; therefore, the difference may be explainable by that fact.

Table 1. Room Utilization Rates

F'11-S'17	# of time blocks used	% use of available blocks
FO 305 MWF	61.63	64%
FO 329 MWF	61	64%
FO 305 TR	50	69%
FO 329 TR	54	75%
305 Night	26	43%
329 Night	19	32%
305 Total	137.63	53%
329 Total	141	54%

In addition to teaching blocks, the authors also examined amount of time the classrooms were utilized by minutes. The average weekly hours the classrooms were utilized equaled 30.28 for one of the rooms and 28.44 for the other over the six-year period. In comparison, the average for all university classrooms over the previous five-year reporting window was 28.9. The utilization rates, thus, were similar to other classrooms on campus.

One might expect that the use might increase incrementally over time as faculty learned of the rooms' attributes because initially faculty may have been unaware of the renovation. However, over the six-year period no discernable trend emerged. Because the utilization rates revealed no clear preferences or avoidances of the rooms by faculty, the authors administered a survey to obtain more information.

B. Faculty Survey

Seventy faculty were surveyed to determine if the Scale-Up rooms support their pedagogy; forty-five responded for a 62% response rate (Table 2). Faculty were asked if they had taught in a Scale-Up room. Of the respondents, 27 (60%) had while 14 (31%) had not; four (9%) gave no indication.

Overwhelmingly (71.1%), faulty require some degree of small group interactions in their courses. Respondents were mixed on whether or not the round tables supported their pedagogy and facilitated student interaction. Faculty (24.4%) who reported that they did not require small group interaction also stated that

the furniture did not support their pedagogy (54.5%). Just under one half (47.7%) of respondents agreed that "the round tables support my pedagogy," while 40.8% disagreed. Most (73.3%) of the respondents agreed that "the furniture supports interaction and small group exercises." Twenty percent neither agreed nor disagreed, regardless whether or not a respondent had actually taught in one of the rooms.

Table 2. Responses
SA=strongly agree; SWA=somewhat agree; N=neither agree nor disagree; SWD=somewhat disagree; SD=strongly disagree.

	SA	SWA	N	SWD	SD
I try to avoid teaching in classrooms with round tables.	n=15 33.3%	n=4 8.9%	n=9 20.0%	n=3 6.7%	n=13 31.1%
The round tables support and complement my pedagogy.	n=14 31.8%	n=7 15.9%	n=5 11.4%	n=12 27.2%	n=6 13.6%
The round tables are the appropriate size.	n=5 11.4%	n=10 22.7%	n=15 34.1%	n=8 18.2%	n=6 13.6%
The furniture makes efficient use of the learning space.	n=5 11.1%	n=10 22.2%	n=13 28.9%	n=10 22.2%	n=7 15.6%
The furniture does not enhance my pedagogical approach.	n=7 15.9%	n=10 22.7%	n=6 13.6%	n=12 27.3%	n=6 20.5%
I do not require small group interaction during class.	n=6 13.3%	n=5 11.1%	n=2 4.4%	n=11 24.4%	n=21 46.7%
The furniture provides sufficient flexibility for the learning space.	n=5 11.1%	n=15 33.3%	n=9 20.0%	n=11 24.4%	n=5 11.1%
The furniture makes it difficult for the instructor to circulate.	n=6 13.3%	n=10 22.2%	n=12 26.7%	n=11 24.4%	n=5 13.3%
The furniture supports student interaction and small group exercises.	n=13 28.9%	n=20 44.4%	n=9 20.0%	n=3 6.7%	n=0 0.0%
The furniture enhances my collaborative learning approaches.	n=12 26.7%	n=10 22.2%	n=13 28.9%	n=9 20.0%	n=1 2.2%
The furniture makes test administration difficult.	n=18 40.0%	n=11 24.4%	n=6 13.3%	n=6 13.3%	n=4 8.9%

Faculty members were equally divided in their responses to the question "I try to avoid teaching in rooms with round tables," whether or not they taught in one of the rooms. Forty-two per cent either strongly or somewhat agreed with the statement; thirty-eight percent either strongly or somewhat disagreed. Qualitative comments given for why faculty avoided

the Scale-Up included the size of the tables, the spacing of the tables, and the difficulty in administering tests. The answers to the questions on size, spacing and testing difficulties confirmed these issues. For example, when asked to respond to "the furniture makes test administration difficult," 64.4% agreed and 23% disagreed. In response to "the furniture makes efficient use of the learning space," 33.3% agreed and 37.8% disagreed.

Faculty overwhelmingly expressed a desire for smaller numbers of students per table. Asked to rank the appropriate number of students per table, 4, 5, 6, 8, 9, or "other", four was the most popular size followed by five and six. Only five faculty ranked a size of eight, nine, or "other" as one of their top three preferences. Qualitative comments suggested that the 9-top tables were too big, that larger tables made the room seem crowded and resulted in too much dead space in the middle of the tables, and that the cumbersome tables presented a "circulation" problem for faculty when mentoring the groups. Faculty expressed a preference for smaller tables, either rectangular or half-moon, which would allow for flexibility in grouping students.

Comments also revealed that faculty tended to use a mixed method pedagogy, breaking students into groups for exercises while also lecturing or using white boards to explain concepts before, after or during the group work time. While the round tables facilitated group interaction, that trait frustrated lecturing because the instructor would be "teaching to the fronts of some students and the backs of others." Generally, results indicated that the round tables greatly facilitated collaborative work, but were counterproductive and inconvenient for lecturing, even if the lecture comprised only a part of the class period.

5. CONCLUSION

The faculty surveyed confirmed the trend toward collaborative learning during class in which teams of students construct knowledge with guidance from the professor. Over 78% of the faculty surveyed required some degree of small group interaction during the class period, although abbreviated lectures sometimes complemented this pedagogical approach.

The appropriate configuration of classroom furniture typically is different for lecture as opposed to group work. Therefore, the selection and arrangement of furniture in classrooms can have a profound positive or negative impact on instruction depending on the circumstances. Relevant factors that affect learning include comfortable seating for students, furnishings

to accommodate pedagogical approaches and a sufficient infrastructure for the technology employed.

The faculty surveyed tended either to like or dislike the Scale-Up rooms; few were indifferent. Their feedback on whether or not the room configuration supported their pedagogy was similarly bifurcated. This split suggests that it is wise to consult faculty on any planned classroom renovation projects (Villano, 2014).

Moreover, the results support the use of smaller furniture that is easily capable of flexible arrangements. The potential negative of smaller and more mobile furniture is the increased potential for the classroom being in disarray after its conclusion or in need of re-configuration after every class period, which could delay the start of class and foster other frustrations.

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