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Implementing the Montessori approach in an undergraduate marketing course: A case study

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The objective of this case study is to offer a new perspective on innovation in higher education pedagogy by exploring how Montessori principles can be applied in an elective upper-level undergraduate marketing analytics course. Innovation in higher education is crucial for preparing students for the ever-changing challenges they will face in the workplace and in society. Montessori education offers a unique perspective for addressing many of the shortcomings identified in current approaches to undergraduate instruction. This study involved designing a course that incorporated well-established principles of Montessori education—which has demonstrated success in fostering deep learning, engagement, intrinsic motivation, and adaptability particularly among adolescents. The methodology leverages the naturalistic approach to gathering real world evidence using an inductive design based on data from instructor field notes, weekly student response submissions, and an end-of-semester student survey. In conclusion, results of the study suggest Montessori education, particularly experiential learning elements and direct connections to industry, should continue to be explored for its potential to inspire innovation in higher education. However, successfully changing the instructional paradigm requires efforts beyond a single course. Truly shaping undergraduate education for the 21st century involves broad and integrated change across departments and even universities to empower students to take control of their own learning, to be inspired and motivated by their own intrinsic values, and to expand their thinking beyond narrow expectations of textbook learning.

KEYWORDS

Montessori, marketing education, case study, higher education pedagogy, pedagogical innovation, undergraduate education

Introduction

Pedagogic innovation in post-secondary education is a topic of growing interest because, despite the recognized need for a more student-centered approach, higher education globally continues to be dominated by a traditional, lecture delivery model (Fernandez et al., 2022). In fact, the call for contributions for this *Frontiers in Education* Higher Education Section Research Topic highlights a need for student-centered approaches and innovation to redirect the current global focus away from traditional, expositive lecture instruction which reinforces the power differential between students and teachers (Fernandez et al., 2022). This is not to say that lectures have no place in higher education pedagogy. A number of scholars since Goffman's (1981) essay on "The Lecture" have defended the value of the lecture approach (Bland et al., 2007; Stover, 2016; Offstein and Chory, 2019). In particular, authors in the field of communication have argued that the effectiveness of the lecture format is at least partially due to often unmeasured variables related to the lecturer's proficiency as a communicator rather than flaws in the approach itself (Meyer and Hunt, 2017). Others have argued for a more balanced strategy saying,

> Framing lecture and active learning as a dialectical tension allows us to agree that active learning is desirable while allowing individual faculty members to decide for themselves the best ways to enact it. One can be both a sage on the stage and a guide on the side, varying in emphasis within an individual class session and over the semester (Mallin, 2017, p. 242–243).

Still, a growing body of evidence, including a 2015 review of the literature, suggests that "active learning in the classroom setting supports and fosters learning to a much larger extent than conventional large-group teaching" (Schmidt et al., 2015, p. 12).

The call for more student-centered approaches in higher education is not new. Over 80 years ago, Maria Montessori (1939) criticized university education in terms that would resonate with many higher education faculty today arguing that the university had lost its intellectual dignity. She believed students were evading work as much as possible as they simply focused on passing exams on the way to obtaining a degree without considering the learning itself. She said,

> Study, such as it is today, is a work against nature, so the students carry it out aridly and under compulsion without animation. A supreme encouragement and a radiant light would be necessary to call forth those souls which by now are crippled by inertia and error. But this cannot be accomplished by that arid type of school which considers the personality of the student so much below his real values,

and continues to increase his discouragement and inertia (Montessori, 1939, p. 16).

Instead, Montessori (1939) suggested that in an ideal educational environment, "pupils will become ardent apostles, intelligent critics and almost cooperators with their professors" (p. 16). She claimed, "intellectual education" requires cooperation "if one wishes to prepare not only the intellect, but the human personality in its totality. In other words, merely to study is not to live, but to live is the most essential condition in order to be able to study" (Montessori, 1939, p. 16).

Montessori's call for a more holistic approach to higher education is even more relevant today due to the growing prevalence of mental health challenges among college students and declining reported wellbeing within this population (Storrie et al., 2010; Hill et al., 2019; Jones et al., 2021; Sheldon et al., 2021). Student-centered pedagogical approaches can provide young adults with a healthier foundation for managing the stresses of academic demands and the transition to adulthood by enhancing self-efficacy beliefs and resilience (Hill et al., 2019). Trends in declining wellbeing were already evident even before the COVID-19 pandemic which has only exacerbated the situation. One hypothesis is that curtailed social interactions hindered building strong bonds and a sense of belonging which in turn led to increased anxiety, stress, and depression at a time when young adults rely on peer bonding for navigating the challenges of this life stage (Patias et al., 2021). One recent study investigated the efficacy of an intervention for undergraduates during the COVID-19 pandemic and found that encouraging connection to self, others and nature produced beneficial impacts on wellbeing (Kemp et al., 2022).

In addition, a more holistic approach to education can also support developing skills that are compelling for hiring managers who value twenty-first century competencies such as collaboration, communication, and problem-solving as they relate to job performance (Mahmud and Wong, 2022). While candidates with necessary technology skills are scarce, employers also see gaps in new graduates' having the adaptability and flexibility necessary to succeed in the rapidly changing workplace. Socioemotional skills including knowledge and innovation which involve logical reasoning and information gathering skills are also being recognized and rewarded in the workplace (Allen et al., 2020). These socioemotional skills have been shown to be enhanced by active learning methods which support learner agency (Allen et al., 2020). Assessment in higher education typically includes high stakes exams, projects, and assignments. These types of assessments put psychological stress on students that can negatively impact wellbeing. However, this stress can be balanced through varying the impact of traditional and novel assessments and through demands of collaborative and individual work (Jones et al., 2021). Supporting twenty-first century competencies, promoting socioemotional skills,

and rethinking assessment in higher education share a common theme—the opportunity to create viable new models of instruction that empower students with the agility necessary to respond to the demands of the career paths they will traverse. While Montessori education offers a student-centered approach that empowers students and fosters learner agency, its holistic focus also embraces the importance of social dynamics and healthy classroom communities which seem likely to have an even greater impact in a post-pandemic higher education world (Kahn, 2016).

The objective of this study is to describe the implementation of the Montessori educational approach in an undergraduate marketing analytics course to illustrate how Montessori principles offer a new perspective on innovation in higher education pedagogy. Research suggests that Montessori education for adolescents can foster deep learning, engagement, intrinsic motivation, and adaptability (Rathunde and Csikszentmihalyi, 2005), so we extended these ideas to design a new undergraduate course through a collaboration between an award-winning business school faculty member and a veteran Montessori adolescent teacher educator. In this study, we demonstrate how applying an educational approach with success in settings for younger students for over 100 years (Lillard et al., 2017; Marshall; Rathunde and Csikszentmihalyi, 2005) represents a source of innovation when applied to an older student population. A few authors have explored the application of Montessori principles in the space of higher education (community college and law school) and workplace leadership, but this is the first that explores its applicability in a business school setting (Dhiraj, 2012; Grant, 2015; Lorenz, 2015). In this article, we describe both the Montessori-based practices employed in the course as well as students' responses to the experience of participating. First, however, we outline the theoretical framework which provides the basis for the Montessori approach taken in the course.

Theoretical framework

In the early twentieth century, Maria Montessori became one of Italy's first recognized female physicians and began her career working with disabled children (Kramer, 1988). This experience led her to develop the approach, primarily associated with early childhood education, that bears her name. The curriculum, environment, and pedagogy were designed based on Montessori's meticulous observations of children with the goal of addressing the development of the whole child (Hainstock, 1997; Lillard, 2016). Similar to Piaget's (1926) stage theory, Montessori (1912) based her pedagogy on four planes or phases of development which she theorized from birth through adulthood. She devoted considerable time developing and refining pedagogies to support learners in the first two planes of development, ages 0–6 and 6–12. However, the later

planes of development, ages 12–18 and 18–24 which she spent less time discussing are the focus of this study.

The remainder of this section summarizes the theoretical foundation for Montessori education relevant for this study beginning with the concepts of engagement and self-directed learning which apply across all levels of Montessori education. The theoretical foundation section concludes with an overview of Montessori theory applied to the third and fourth plane.

Engagement

Montessori pedagogy is designed to foster deep engagement through freedom and discipline (Rathunde, 2009, 2014). This means that students are granted a relatively high degree of choice regarding the content, focus, and approach to their daily learning activities. Simultaneously, the classroom culture calls for high expectations and continuous engagement with self-discipline viewed as a natural process of development (Andrews, 2012). In other words, students organize their time, pick their own topics to study, and choose how long to spend on each a lesson with in-built expectations for self-discipline around sharing time, space, and resources with peers and being focused and engaged throughout the school day.

Engagement in work that is meaningful to students is the basis for achieving a classroom with freely chosen productive work, self-discipline, and constructive peer interactions. At all levels, Montessori practices rely on sparking students' interests through knowledge of each student individually and through making available tasks with real world significance. These activities foster intrinsic motivation which in turn supports self-regulation (Basargekar and Lillard, in press).

Studies comparing Montessori and traditional schools find engagement is more likely to occur when there is an intrinsic desire to work on material that is both relevant and challenging (Rathunde, 2014). Moreover, research finds that students have superior learning outcomes when they are motivated by, engaged in, and have some control over their learning (Boekaerts, 1998; Reeve et al., 2004; Niemiec and Ryan, 2009; Reeve and Halusic, 2009). This can be supported when the work has intrinsic value (e.g., the goal is personally meaningful) or utility value (e.g., the goal relates to current or future goals like a career goal) (Eccles and Wigfield, 2020).

Self-directed learning

Within Montessori pedagogy, the "prepared environment" is designed to support self-monitoring and self-evaluation. These opportunities encourage students to take a role in determining if they have mastered a concept. For example, adolescent students typically lead parent-teacher conferences.

Although the responsibility for learning lies with students, the Montessori approach offers scaffolding and appropriate demands. For instance, teachers make clear what students should learn from lessons and offer meaningful follow-up tasks to ensure students' learning takes hold. Montessori teachers also highlight student responsibilities and help summarize learning.

Across age levels, assessment in Montessori classrooms takes a unique form. As teachers incorporate formative assessment over high stakes exams, students gain confidence in their ability to choose work and progress through the curriculum. Even the youngest students leverage the embedded nature of assessment within the Montessori didactic materials to gauge the accuracy of their work without adult involvement. The early childhood and elementary materials are designed to make errors directly evident to children as they engage in the activity. In older grades, students produce self- and peer-evaluations as well as evaluation in collaboration with teachers all of which support an atmosphere of self-directed learning and establish a more balanced power structure than exists in more traditional classrooms (Zoll et al., in press).

As students get older, they are given more responsibility. For example, adolescent-aged students are tasked with planning outings, organizing events, and even running their own businesses (Montessori, 1948). Students are constantly offered feedback, through didactic materials when they are younger and through one-on-one meetings and detailed written evaluations when they get older (Hainstock, 1997). Students learn to be responsible for and take ownership of their learning, which can translate into feelings of autonomy, self-efficacy, and intrinsic motivation (Thomas et al., 1988). Current research suggests that providing autonomy-support also nurtures intrinsic motivation (Boekaerts and Niemivirta, 2000). Autonomy supportive classrooms are "social environments that. provide meaningful rationale, acknowledge negative feelings, use non-controlling language, offer meaningful choices, and nurture internal motivational resources" (Núñez and León, 2015, p. 275).

Montessori theory of adolescence and emerging adulthood (third and fourth plane)

Adolescence, or the ages from 12 to 18 years of age, fall into what Montessori called the Third Plane, which is characterized by Association Montessori International/USA [AMI/USA] (2022a) as answering the question, "Who am I?" This phase is represented by a focus on physiological and emotional changes, idealism, exploring vocations, abstract learning, and need for respect. Montessori believed this age group's natural tendencies are optimally developed when students are allowed to collectively address practical challenges in environments that provide natural freedom and choice within

a context of global purpose (Kahn, 2016). She argued that responding appropriately to these adolescent tendencies would reveal an adult able to fulfill the needs of their time and place and capable of adapting to new situations and circumstances (Grazzini, 2004).

Montessori described a primary aim of adolescence as the coordination of one's potentialities. This clear step into adulthood involves "a succession of differing levels of independence in correspondingly suitable environments" (Hoglund, 2011, p. 166). As such, Montessori-inspired classrooms for adolescents and young adults are intentionally designed to promote valorization. Montessori used the term "valorization" to reflect the adolescent's gradual process of becoming a strong and worthy person upon realizing they are useful and capable of effort (Donahoe et al., 2013). Valorization, she argued, is realized when adolescents experience the joy of successfully employing the work of the mind, hands, and heart to meet challenges of appropriate responsibilities and expectations (Donahoe et al., 2013, p. 18.). While she had a broad vision for adolescent education, Montessori's educational plan for adolescents was less specific than for younger ages, and she spoke very little on the next phase, the Fourth Plane.

The Fourth Plane of development (ages 18–24) represents young adulthood which Association Montessori International/USA [AMI/USA] (2022a) suggests should answer the question "What will I do?" in Montessori's model. The focus in the Fourth Plane is on personal responsibility and interests, spiritual, emotional, and moral independence, and consideration of one's place and contribution to society and humanity. Students enrolled in a traditional undergraduate course are most likely to be in the Fourth Plane of development. However, in affluent western countries such as the U.S., there is growing recognition of a prolonged period of adolescence. Sometimes referred to as the emerging adult (Arnett, 2004), many of the developmental milestones once thought to be completed in adolescence are sometimes delayed into emerging adulthood (ages 18–30). Thus, priorities for optimal development in both Montessori's Third and Fourth Planes along with fundamental concepts of Montessori education across age levels provided the foundation for the approach implemented in the undergraduate marketing course examined in this case study. The key Montessori principles guiding the course design include:

1. Facilitating the development of community;
2. Prioritizing engagement and motivation;
3. Varying teaching and assignment formats;
4. Decentering the teacher;
5. Applying non-traditional assessment strategies. (Lillard and McHugh, 2019a,b)

Specific strategies used to incorporate these principles into the classroom for this case study are discussed under

Intervention Design in the Section "Materials and methods" that follows. The Section "Materials and methods" outlines the details of the study where we explore the broad research question: How can the application of Montessori principles in an elective upper-level undergraduate marketing analytics course provide new perspectives on innovation in higher education pedagogy?

Materials and methods

The first author of this paper is an experienced marketing lecturer who, in collaboration with the second author who is a veteran Montessori adolescent teacher educator, developed a new upper-level marketing analytics elective course incorporating a novel approach to the course content based on the Montessori method of education. The sections that follow provide the details of the case study beginning with a description of the course design.

Course design

This case study began with implementing a new course designed around the five fundamental principles of Montessori education outlined in the previous section. The overall flow of the semester is depicted in **Figure 1**, and specific components of the course are described in **Table 1**. Here we explain how these components as well as other instructional design elements incorporated into the course address each of the five fundamental Montessori principles that inspired this project.

Facilitating the development of community

Fostering a sense of community is crucial for Montessori learning environments across the age span, so this course incorporated practices to support a sense of belonging and connection. The semester kicked off with an icebreaker "snowball fight" game in which each student listed three things about themselves along with three work-related aspirations on a piece of paper which they wadded up into a snowball. The game proceeded with people tossing the snowballs around the room, picking them up randomly, and trying to figure out whose snowball was whose. Since this was at the beginning of the semester, the icebreaker set the tone for an interactive and engaging course with a focus on peer respect and interaction.

Splitting the semester into two blocks (or cycles following Montessori adolescent terminology) served as the primary mechanism for community-building and cohesion throughout the semester. Each cycle started with a seminar discussion based on a reading or video related to the cycle theme in order to encourage students to think critically about bigger picture issues impacting careers in marketing. Ground rules for the seminar discussions reinforced the atmosphere necessary for a

respectful learning community such as being prepared for the discussion by reviewing background material, not talking over one another during the discussion, responding to each other by name, expressing agreement and disagreement courteously and thoughtfully by agreeing or disagreeing with statements rather than people, and, most importantly, remaining open-minded. Each cycle closed with another group activity to reinforce concepts and close out the theme of that portion of the semester.

Cycle one revolved around "Identity, your place in the working world," and the cycle's opening seminar discussion was based on an article entitled "What to Look for in a First Job." The closing activity for cycle one was forming student teams to create a research consulting project proposal using the analytical tools covered in class to address a marketing problem from mini business case scenarios. Each team created a proposal and "pitched" it to another group who served as the client. The consultant and client teams negotiated a hypothetical contract which served as a hands-on activity exploring possible roles in the working world and which culminated in a lighthearted competition among the teams.

Cycle two related to an ethics theme, "Finding profit in the greater good." The cycle two seminar involved two choices for the preparatory material: (1) Watching the movie *The Big Short* (Lewis, 2011) or reading an article by Plangger and Watson (2015) entitled "Balancing customer privacy, secrets, and surveillance: Insights and management." The seminar involved breaking the students into two large discussion groups to consider the preparatory material in terms of the portrayal of business ethics in the media, its impact on public opinion, and their role in perpetuating or changing this impression in their future roles as business leaders. Cycle two concluded with group-based discussion board posts related to an ethics of data use video from CBS's 60 min entitled "The Data Brokers: Selling your personal information" (Gavrilovic, 2014). Students reviewed the American Marketing Association Statement of Ethics (American Marketing Association [AMA], 2016) on the Blackboard Learning Management System (LMS) and both commented on the existing statement and generated a list of additional guidelines based on the video and recommendations from an Acxiom (2015).

In addition to the two-cycle structure of the semester, other elements of the course were incorporated to foster a sense of community. Independent work during class time included opportunities for informal conversations and discussions of challenges students faced to encourage peer learning, camaraderie, and trust. In addition, based on required readings for each module, students formed small weekly discussion groups, called Q&A Discussions. In these small group discussions with classmates who chose the same module topic that week, students worked during class time to collaboratively answer questions on the topic prepared by the instructor. More information about the module expectations follows in the next section about prioritizing engagement and motivation.
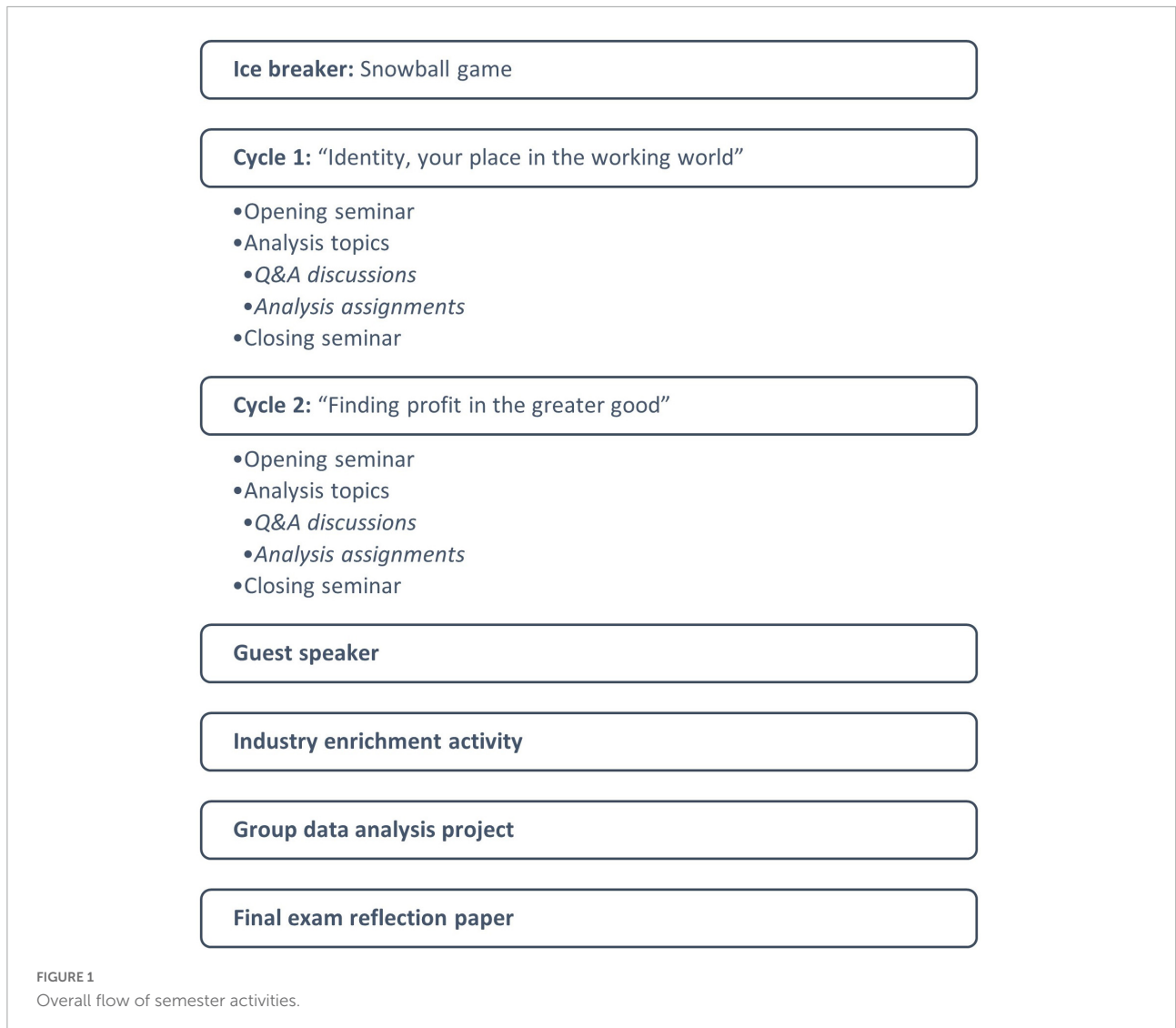
FIGURE 1
Overall flow of semester activities.

TABLE 1 Course components.

Required activities in the course included:

Cycle activities:	The course was organized into two cycles which split the semester into two blocks. Each cycle began with a facilitated seminar discussion based on assigned readings or videos designed to encourage students to think critically about bigger picture issues related to careers in marketing. Each cycle ended with a group closing activity to revisit the cycle topic and provide closure.
Q&A sessions:	Based on required readings for each module, students formed weekly groups during class meeting time with those who chose the same module topic to discuss questions prepared by the instructor related to the topic they were currently working on.
Hands-on module assignments	Seven modules were required over the course of the semester. Each module addressed a different analytical tool and involved a hands-on assignment applying the tool to a real-world dataset.
Semester project:	Groups were formed by the instructor based on information provided by students in introduction discussion board post gathering their interest in analytics and capacity for effort on the project and anyone else in the class they would like to work with. Groups were required to conduct a meeting with instructor to discuss plans before beginning work on the project.
Industry enrichment activity:	An industry enrichment activity was designed to help students get feel for marketing analytics in the "real world," was a required component of the course.
Class participation:	Class participation included engagement in class activities, providing feedback on their own learning, and group participation experiences.

Prioritizing engagement and motivation

Encouraging deep engagement and intrinsic motivation are hallmarks of Montessori education, so the course focused on creating interesting, real-world data analysis opportunities, providing the right guidance and encouragement at the right time for each student, and establishing blocks of time where students could immerse themselves in their work. On the first day of class, the instructor/researcher provided a brief background on Montessori education explaining that, although they may be familiar with the approach in preschools, it is growing in middle schools and high schools. Basic principles of Montessori education (Table 2) and recent applications with adults (law school, new hires, and community college) were explained. The instructor outlined the expectation that students would take the initiative for guiding their own learning so that what they got out of the course would be determined by what they put into it.

The course met in person twice each week for 1-h and 15-min. During most weeks, Mondays were reserved for discussing the reading for each of the analytical techniques (termed Q&A sessions), and Wednesdays were hands-on work days implementing the analytical techniques discussed on Monday of the same week with real world data. The required textbook was Grigsby (2015)'s *Marketing Analytics: A Practical Guide to Real Marketing Science* and the required software was SPSS available through the university's cloud based virtual lab or on laptops during class. Seven modules were required over the course of the semester. The modules incorporated data from a variety of sources to provide students with the tools necessary to engage in today's data rich decision-making environment and to equip them with the quantitative foundation to leverage new analytical tools likely to emerge throughout their careers. Each module addressed a different analytical tool and involved a hands-on assignment applying the tool to a real-world dataset. Each module included links to online resources to understand how to execute the analysis in SPSS. The modules were broken down so that four modules were covered during cycle one in the first half of the semester, and three remaining modules were covered in cycle two in the second half of the semester. Table 3 outlines the topics covered which included a variety of multivariate statistical techniques as well as big data and digital analytics. While all students were expected to cover all of the module topics during the semester, they would decide the order and depth they engaged with each within this unconventional approach.

Varying teaching and assignment formats

The instructor varied teaching strategies including individual, small group, and large group instruction. As discussed in the facilitating community and encouraging engagement sections, assignments and activities were designed

TABLE 2   Montessori principles.

Students were provided with a list of Montessori principles as context for project:

Freedom within limits

Active and hands-on learning

Student led work

Individualized learning

Revolving around peer relationships based on courtesy and respect

Downplaying competition and encouraging striving for personal best

TABLE 3   Module topics.

First cycle modules	Second cycle modules
Targeting: Logistic regression	Digital analytics
Segmentation: Cluster analysis	Big data
Advanced MR techniques: Conjoint	Integrated data sources
Marketing experiments	

to interweave subjects, real world activities, and both short- and long-term projects. These real-world activities are consistent with the concept of experiential learning which is gaining interest for its potential to address the "persistent critique that colleges and universities do not prepare students adequately for the world of work" because it inherently connects students with experiences in the outside world (Roberts, 2018, p. 3). The course also incorporated multi-layered, differentiated assignments using a variety of modes of learning. Classroom activities were designed to encourage conversation requiring divergent and convergent thinking with connections to the text, personal experience, and other assignments.

Decentering the teacher

Across age levels, Montessori education places the teacher in the role of a facilitator and collaborator with some in the Montessori community preferring the term "guide" over "teacher" (Association Montessori International/USA [AMI/USA], 2022b). The instructor in this course similarly approached students as a patient observer, monitor, and coach rather than an all-powerful and all-knowing authority. Strategies for shifting the locus of control to the students came from course design elements discussed previously including ceding control of pace and sequence of content to the students, allowing independent choice among options along with opportunities for being proactive, practicing time management, and directing their own learning process through questioning and seeking their own answers. Assessment for the course is discussed in the following section and supported this unique role for the instructor.

Applying non-traditional assessment strategies

Montessori education, even for older students, prioritizes authentic and formative classroom assessment over high stakes exams and grades (Becker et al., 2022). In this course, students engaged in self-evaluation using checklists to monitor understanding. For example, on days when students engaged in small group discussions, they submitted "exit slips" reflecting on their participation and learning which were credited toward class participation. In addition, along with more traditional responses to questions about the data analysis results, the work day module assignments were graded based on a self-evaluation form that included a question about the difficulty of the task and a description of steps students took to address the challenges they encountered. The instructor also provided one-on-one feedback through observations and informal interactions on multiple occasions. These occasions included informal conversations when students worked on assignments during class as well as scheduled conferences with student groups as they worked on their semester projects. These formative assessments provided opportunities for students to take risks and push themselves without fear of negative impacts on their grades.

As expected in the marketing program, the course did assign letter grades for student performance in the class as a form of summative assessment, but the structure of these grades reflected the priorities of the class. The largest proportion of points (60%) came from class participation and homework/classwork. The semester project represented 20% of the points, and the final exam represented only 10% of the course grade. The semester project was student-driven with groups implementing an analytical technique covered in the class that they were interested in exploring further using interesting datasets they identified. Groups were formed by the instructor based on information provided by students in an introduction discussion board post which asked each student about their interest in analytics and capacity for effort on the project and inquired about anyone else in the class they would like to work with. Each group was required to conduct a meeting with the instructor to discuss plans before beginning work on the project.

The final exam was an open-book, open-note, take-home format with prompts designed for student reflection on what they learned over the course of the semester and how it would apply to their careers. The first question on the exam asked students to choose three of the analyses covered during the semester and describe how they might be useful to a business they would be interested in interviewing for. The second final exam prompt allowed students to respond to a series of queries from one of three "interviewers." The interviewers were the instructors' colleagues who were working in the industry and who described the types of questions they typically ask of entry-level analytics candidates. The final 10% of the course grade was an individual industry enrichment assignment of the students' choosing which required them to engage on some level with

businesses involved in marketing analytics. Choosing among the wide range of acceptable options depended on student interest and included job shadowing, interviewing analysts in the field, or simply analyzing articles about marketing analytics in the real world among other options proposed by students.

Now that we have described the intervention, the remaining sections in part three describe methodological elements of the case study design.

Participants

A total of 28 students were enrolled in the class and were invited to participate in the case study research project. Approval was obtained from the university institutional review board, and 26 students consented to participate. Consistent with the demographics of the School of Business, the class was predominantly white with a small number of international students and students of color. The gender breakdown was fairly even with somewhat more females ($N = 17$) than males ($N = 11$). Nineteen students participated in the end-of-semester anonymous survey in which almost half reported GPAs above 3.50 ($N = 9$), with the remainder between 3.00 and 3.49 ($N = 6$) or between 2.50 and 2.99 ($N = 4$).

Case study approach

This study followed a case study design as described by Gillham (2000) because it represents "human activity embedded in the real world" which "can only be studied or understood in context" (p. 1). As is characteristic of case studies, this investigation relied on multiple sources of evidence with each having its own unique strengths and weaknesses. The case study design leveraged the naturalistic approach to gathering real world evidence using an inductive design to allow findings to emerge out of the data collected by the instructor in the role of participant-observer (Gillham, 2000). Due to the inherently subjective nature of this type of research, the instructor/researcher acknowledges her role as a faculty member in a research one, state university along with her status as a white *cis*-gender female which creates a specific positionality and frame of reference that influenced this study from its inception and execution to its analysis. The impact of possible researcher influence on findings from her position of power and possible bias toward her anticipated findings were mitigated by looking for disconfirming evidence and triangulating data from multiple sources (Gillham, 2000).

Data sources

Data collected for the study included instructor field notes, weekly student response submissions, and an end-of-semester

student survey. Instructor field notes were documented at the conclusion of classes each week in a document stored on her computer. The fieldnotes included candid observations about the week's successes and challenges as well as reflections on how to improve the process going forward. Weekly student responses were in the form of "exit slips" completed at the conclusion of class after the Monday Q&A discussion sessions. Students responded to five Likert-scale questions related to their participation, preparation, and engagement. A total of 182 exit slips were collected across the semester. The end-of-semester survey included both open- and closed-ended questions, including Likert and multiple-choice items as shown in **Table 4**.

Ethical considerations

Since the researcher was also the instructor of record for the course, ethical considerations were important. The research activities involved classroom activities as part of the regular learning experience in the course regardless of study participation, and the consent form signed by students who agreed to participate outlined the expectations, risks, and benefits. Specifically, students were asked to acknowledge they understood that:

1. Students who participate in this project will exert no additional effort and will face no additional risk based on their participation because this project involves only "normal education practices" in an educational setting. Conversely, students will experience no adverse consequences for deciding not to participate in the project because the student experience in the course will be no different for those who are participating and those who are not participating in the research project. Grades will not be affected by participation.
2. Student records are not at any greater risk of disclosure for this study than they are for students in any class at the university. Grades will be tracked in the Blackboard

TABLE 4 Survey topics.

Topics in the end of semester survey included:

Perceptions of differences in format, learning and enjoyment relative to traditional classes

Preferences for various course components

Most and least favorite aspects of the class, including rationale

Feedback on specific modules

Agreement with statements about their participation in the class

Space for open-ended comments about students' experiences, positive and negative

system, as is standard practice, for both participants and non-participants.
3. There are no direct benefits to participants because students' learning experience will be unchanged regardless of whether or not they choose to participate in the research project.
4. There will be no compensation or credit for participating and there will be no negative consequences if participants withdraw from the study.
5. Students are not required to sign the Consent and Authorization form and they may refuse to do so without affecting their right to any services. However, those who refuse to sign cannot participate in this study.

Results

The results presented here summarize findings from each of the data sources outlined previously: field notes, weekly student responses, and the end of semester student survey.

Field notes

The instructor's field notes compiled over the course of the semester were organized by type of activity for the purposes of analysis. Identified themes and direct quotations from the field notes are provided in the sections that follow: overall semester framework activities (initial ice breaker, cycle seminars, and cycle closing activities), small group Q&A discussions, work days for weekly assignments, and project-related activities.

Course framework activities

The semester started off on a high note with field notes reporting, "Snowball ice breaker was a big hit. didn't note anyone sitting back and not participating. Most were smiling and talking. I overheard lots of questions about majors and where people were from. Saw much smiling and mingling and not just sticking by friends." The cycle opening and closing activities seemed to interest students with most of them seeming to be "well-prepared," but students were not actively engaged in the discussion for the opening seminar which was based on the first cycle theme of students' role in the working world. The limited discussion that did occur was "interesting but really never took on any momentum." The instructor noted that, "Often I ended up having to call names to get people to talk." The reluctance to deeply engage with classmates became a recurring theme over the course of the semester. The cycle one closing activity in which students pitched their research proposal in small groups generated active discussion and very positive feedback including a "unanimous reaction that this was a valuable activity that I should do in future semesters." The

majority of students seemed very engaged and motivated to create an effective proposal. The process of selling the idea to the "client" teams also generated productive discussions.

The groups of roughly eight students each discussing the cycle two opening seminar generated engagement and interest in the topic of business ethics with the groups spending about a half-hour in their group discussions. The conversation revolved around Hollywood's portrayal of businesses and how these students will contribute to the image of business in their roles as future business leaders. Students had the option of watching the movie *The Big Short* or reading an article. Roughly two-thirds of the class watched the movie and a smaller but significant group read the article. There was general agreement that Hollywood does portray business negatively but that this is not the way all businesses are viewed. Students argued, "Sometimes business is the bad guy and so depicting that in movies is only appropriate and necessary to point out those few that are bad cases." Students reported that ethics discussions in most other business courses are given cursory attention and the scenarios discussed are not very realistic or thought provoking. Students said they had "no real sense of the gray area of ethical dilemmas." In class, students responded that this "was a valuable activity that helped them see some of the issues that professionals in fields dealing with customer data will have to deal with in the future." The cycle two closing activity involved group comment posts to the LMS bulletin board. The activity seemed to be only moderately effective with the field notes saying, "Limited depth of discussion. Lots of 'I agree with your points' kinds of comments and some rather surface-level suggestions about disclosing more about the sharing of information. Not a bad experience but not particularly fruitful."

Q&A discussion sessions

The Q&A Discussion Sessions generated the largest volume of fieldnotes with the most evidence of presenting challenges for the instructor. At the beginning of the semester, students did not seem to understand the need to be prepared for the discussion sessions with many students not having their books and not having done the readings. In fact, the fieldnotes state, "Many didn't seem to remember that the book existed, but there were many who did have the book and referred to it during the discussions." In the most productive cases, "People were engaged for about 15 min but ran out of steam." Later in the semester, students seemed aware of the requirements for the discussion sessions, but preparation was still limited. In fact, about 2 weeks into the semester, the fieldnotes say, "Going okay, but a lot of students are not coming to class prepared for the small group discussions and seem to be rushing through the discussion questions based on the reading just to check them off and get out the door." In subsequent weeks, the trend continued, "most people seemed to be done within 30 min. . .some hurtled through in 20. Not sure how much they are getting out of the discussions. They seem to be just trying to get through the

questions rather than really discussing what they mean. I'm frustrated that I can't get them to engage in a more thoughtful conversation. It seems to help when I go talk to them, but it's not happening on their own."

In the following weeks, the instructor asked students questions to understand why the Q&A discussions were not working as intended. The field notes reported that students said it "depended on the module" whether the interaction was valuable, but some felt it was just "easier to do it on your own." There were also challenges with figuring out who was working on the same module they were. In addition, "Several students mentioned that the book doesn't really help them with the homework assignment because it doesn't show them how to do it. I think they miss the point that the book is supposed to talk about the techniques in a theoretical and applied way rather than being an SPSS tutorial." Rather than seeing the textbook as laying the theoretical foundation and offering real world applications for the statistical techniques, students felt it was "hard to follow the book and really wanted me to show them step by step how to do the homework because the book is really overwhelming." Students also began opening up that it is hard to "teach yourself." The fieldnotes continued, "Most students on the first day were happy with the idea of hands-on learning and being responsible for their own learning, but the reality seems to be a challenge."

By late in the semester, Q&A days fell into a routine with most people reading and working independently with some classroom discussion "buzz." However, many students did not see the value of peer discussions and instead continued to be "very task oriented and focused on answering those questions and leaving. No real recognition of the value of the conversation in helping them really understand the concepts." Even when the class was focused and engaged for almost a full hour, most people were working individually not in their groups.

Assignment work days

Assignment work days were much more productive than the Q&A discussion days and seemed to be more valuable to students. With some of the analytical techniques, students seemed so overwhelmed that they did not "know where to start with the process of figuring it out." The instructor wondered if students found the process of figuring things out on their own to be valuable in the learning process saying, "They just seem to be plugging things in randomly and not trying to understand what it is they are doing. It's just sort of throw stuff in there and see what happens and maybe I'll come up with the right answer." After a few weeks, the instructor began doing informal, small group tutorials to walk step-by-step through some of the analyses since students struggled to get started figuring things out independently even with the online resources that were provided. These sessions seemed to be appreciated and attended by small groups of students, but they did not make dramatic changes in students' behavior.

Project activities

The most positive entries in the fieldnotes revolved around the project work days and activities. The first semester group project work day generated this in the fieldnotes, "Today felt like a very good day! Many students seemed very excited about their respective projects and had some good ideas on their enrichment activities. Almost everyone was in attendance and almost the entire class stayed until 10:30 with many lingering after that."

Some of the very motivated students chose job shadowing activities at local analytics firms for their industry enrichment projects. One student's experience was described in the field notes, "They allowed her to sit in on meetings and she got to chat with a range of people. They were supportive of her international study plans." Sharing the industry enrichment experiences at the end of the semester was in the form of "speed dating" where students had a couple of minutes to describe their experience one-on-one with another student before being rotated and paired with a different student. This activity generated some level of engagement as students seemed to be actively conversing. When asked if they enjoyed the sharing activity and the industry enrichment assignment the instructor received lots of positive feedback.

Weekly student responses

Weekly student responses took the form of exit slips collected throughout the course of the semester to provide in-the-moment feedback from students as they reflected on their experience for that week's Q&A discussion. The most positive responses were for the students' engagement level as seen in Table 5. However, this response should be viewed skeptically since the exit slips were not anonymous and were collected for participation points. It is plausible students would have been biased toward inflating their self-perception of their engagement to make a positive impact on the instructor. Still, it is interesting to note that the lowest rated statement was for being fully prepared for class which we would expect to be biased toward making a good impression as well. Perhaps this is an indication that these slips were an honest reflection on their preparation making the engagement results a bit more believable. Still, in combination with other sources of data in this study, the exit slips provide valuable additional opportunities for triangulation.

End of semester survey

All 19 students who responded to the end-of-semester survey reported that the structure of the class was different from their typical marketing classes, with an even split between those who said it was "very different" (9) and those who said it was "somewhat different" (9). Only one student reported that it was

TABLE 5 Exit slip mean agreement ratings (5-point Likert scale, where 5 is "strongly agree" and 1 is "strongly disagree").

	N	M	SD
Completely engaged in class	182	4.56	0.65
Participated actively in class	182	4.44	0.87
Class will help in completing homework	182	4.41	0.73
Class will help in future career	182	4.23	0.84
Fully prepared for class	182	4.22	0.87

TABLE 6 Student mean ratings of their liking of various course activities (5-point Likert scale, where 5 is "like a great deal" and 1 is "dislike a great deal").

	N	M	SD
Hands-on module work days	19	4.63	0.597
Enrichment activity	19	4.42	0.507
Cycle 1 seminar (Discussion of first job and career readiness articles)	19	4.32	0.820
Cycle 2 seminar (Discussion of The Big Short and Balancing Customer Privacy article)	19	4.21	0.631
Guest speaker	19	4.21	0.787
Group analytical project	19	4.00	0.943
Cycle 1 conclusion (Mock proposals and contracts)	19	3.89	0.809
Cycle 2 conclusion (60 min video and activity)	18	3.78	1.003
Review activity	18	3.78	0.732
Module Q&A discussion classes	19	3.26	1.195
Data cleaning activity	17	3.12	1.166

only a "little different." When using a 5-point Likert scale with 5 being "much more" and 1 being "much less," students on average rated their learning ($M = 3.53$, SD = 1.02) in the class as significantly more than in a traditional lecture class format which would be reflected by a rating of "3" [$t(18) = 2.25$, $p = 0.04$, $d = 0.53$]. They rated their enjoyment ($M = 4.21$, SD = 0.85) even more favorably using the same scale [$t(18) = 6.17$, $p < 0.01$, $d = 1.42$].

Students used a five-point scale to rate how much they "liked" class activities (Table 6). The most positive ratings came from the hands-on module work days followed by the enrichment activity, cycle seminars, and guest speaker. In fact, 8 students identified the hands-on module work days as their "favorite" activity and 7 students rated the enrichment activity as such. The least positive ratings came from the module Q&A discussion classes and the data cleaning activity which was a more traditional review activity toward the end of the semester. The largest group of students (12) identified the module Q&A discussion classes as their least favorite.

Students' open-ended comments explained the reasoning for their most and least preferred activities. Positive feedback about the module work days largely revolved around the hands-on nature of the activity and the opportunity to ask questions

and really learn the material. One student said, "Getting to do hands-on work with different analytic models was the best way I learned about it," while another said, "It was nice to work on our homework in class so we could ask questions as we went." Students' preference for the enrichment activity tended to relate to having an opportunity to get exposure to real world work settings. One student said, "Because it was a great eye-opening experience that showed us what the real world is like in digital analytics. It was something that was much better and enlightening than just getting lectured about it in a classroom." While another said, "I had the opportunity to do a job shadow…. It truly changed the way I looked at post-graduate life."

Table 7 shows that students clearly felt an atmosphere of mutual respect and a responsibility for their own learning even though, consistent with the instructor's observations in the field notes, they reported only a moderate amount of preparation for each class.

Summary

Results from the instructor/researcher's field notes including the weekly student responses, and the end of semester survey were fairly consistent. While the field notes emphasized the largely logistical challenges students faced in the data analysis work days, they also recognized the value students seemed to find in the activity. From students' perspective, the positives seemed to outweigh the negatives because on average the data analysis work days were rated as the most positive experiences in the class on the end of semester survey by a substantial margin. Actively engaging with the material and having opportunities for interaction and trial and error seemed particularly valuable based on student comments.

Other positive results related to connecting students to the real world as reflected in both the field notes and the end of semester survey which identified the industry enrichment project as very valuable. Students seemed to appreciate engaging with the analytics industry in a meaningful way that gave them a glimpse into future career opportunities. For similar reasons,

the guest speaker was also rated positively. While the group semester project was also designed to have real world relevance and seemed to receive some of the more positive feedback based on field notes, the end of semester survey indicated ratings for the project to be in the mid-range relative to other aspects of the class suggesting more mixed reactions. Perhaps the biggest surprise is that students rated liking the cycle seminars as fairly positive, right behind the industry enrichment activity. So, while the field notes suggested group discussions did not generate as much engagement as anticipated, students seemed to like participating in these big picture, philosophical discussions related to the marketing analytics industry.

Students' degree of engagement with course material was another area with mixed results. In the exit slips which included students' names, they reported being highly engaged in the activities; however, in the anonymous end of semester survey, students rated engagement as least accurate in describing their participation in the course. The fact that motivation, engagement, and preparation were rated lower than students' feelings of being respected, being responsible for their own learning, and gaining knowledge that will help them in their career seems to suggest that the course may have fallen short on several important and interrelated goals.

The results also suggested areas that were less effective in this unique course design. A consistent theme that emerged in the instructors' field notes which was also evident in the weekly student responses related to a lack of student preparation or reading materials before class. Similarly, being prepared for class was the item students rated lowest in terms of describing their participation in the course in the end of semester survey. This lack of preparation likely contributed to the frustration the instructor noted in the field notes for the weekly Q&A discussions and to the low student ratings for the Q&A discussions resulting in them being their least favorite aspect of the class. Another aspect of the class that seemed to fall short of the instructor's hopes was students taking charge of their own learning. While this was a stated goal of the course and students reported feeling this responsibility in the end of semester survey, field notes suggested that some students struggled to take on this role instead wishing for more directed, step by step guidance.

TABLE 7 Student mean ratings of the degree to which each statement reflects their participation in class (5-point Likert scale, where 5 is "a great deal" and 1 is "none at all").

	N	M	SD
Felt an atmosphere of mutual respect	19	4.68	0.478
Felt responsible for my own learning	19	4.47	0.513
Gained knowledge that will help me in my career	19	4.16	0.898
Believed I was learning something important	19	4.05	0.705
Felt motivated to learn	19	4.05	0.911
Was engaged in activities in class	19	3.89	0.994
Prepared adequately for each class	19	3.58	1.071

Discussion

The purpose of this case study was to understand how the application of Montessori principles in an elective upper-level undergraduate marketing analytics course can provide new perspectives on innovation in higher education pedagogy. This purpose helps to address gaps in the literature around pedagogical innovation in higher education (Fernandez et al., 2022), particularly related to student centered learning

(Alamri et al., 2020) and experiential learning (Roberts, 2018). Innovations in these areas can overcome the widely recognized limitations of the current model of higher education which remains largely based on a lecture delivery model of instruction. The Montessori approach for older students employs practices that can be considered both student centered and experiential which makes it a powerful model for building an innovative approach to undergraduate education. For example, student centered learning addresses the inherent power imbalance in traditional lecture format courses in order to foster student autonomy (Fernandez et al., 2022). In addition, Jay Roberts (2018) outlines a number of reasons for increased interest in experiential learning pedagogy which are related to the effectiveness of the approach as well as providing students with skills in high demand in the workforce. He observes that, "What is clear is that more research on experiential learning in higher education is needed" (Roberts, 2018, p. 5). In response to these identified needs, we conclude this article with a discussion of the implications based on results from this case study incorporating Montessori practices into an undergraduate marketing course.

Experiential learning

The key areas where evidence in this study suggested clear benefits were the interactive, hands-on activities for enhancing learning and leveraging student interest in real-world industry activities. Students largely recognized the unique approach to learning through independent engagement with statistical resources. While the instructor was concerned about a haphazard approach of trial and error, many students appreciated the opportunity to try different approaches without high stakes grades associated with every effort even though they were sometimes uncomfortable with proceeding without step-by-step guidance. For consideration in future courses, this study suggests incorporating more opportunities for taking risks and expanding beyond students' comfort level to strengthen learning. Important strategies to incorporate relate to providing scaffolding to provide students with gradually less guidance in the process of independent problem solving as they become more comfortable with such expectations.

Connections to the industry were also considered very valuable as they connected upperclassmen to careers they would soon be pursuing. Based on this study, future courses should consider more ways to expand these industry connections, beginning with guest speakers but also identifying additional ways of linking to businesses in the field. While the data analysis group projects were designed to be both hands-on and connected to the real world, the assignment could have been enhanced by building in even more of these elements. Incorporating connections to industry in each assignment and activity would be a powerful way to build on this case

study although challenges associated with the post-COVID pandemic workplace may make this more difficult but also even more valuable.

Learner centered approach

While the experiential learning aspects of the course seemed to largely live up to expectations, the learner centered approach components were less effective. The goal of incorporating a Montessori approach was to foster learner agency and encourage students to take charge of their own learning. However, the case study suggested this is difficult to accomplish over the course of a single semester in a class that meets only twice a week with students often looking for more directed, step by step guidance. Efforts to build community to enhance motivation and collaborative learning through the seminar activities generated positive results overall even though robust conversations were limited. These big picture, theoretical discussions seem to have potential for further exploration although it may require additional tactics to increase participation. The weekly small group discussions were clearly the weakest element of the course. This seems likely to be due to a combination of less engaging reading materials, student inexperience with such student driven activities, and students being accustomed to courses where the only important course activities generated a grade. For future semesters, this is an area where significant changes would be necessary to implement this format beginning with strategies for ensuring that the readings are more relevant, valuable and essential to the various topics.

Many of the challenges in encouraging learner agency seemed to revolve around overcoming students' inertia in approaching college coursework using strategies they have found effective in more traditionally designed courses. It was difficult to encourage self-direction and student-led learning activities when this was so different from the expectations in other classes. Students had little experience following their own interests and self-motivating, so they requested more direct instruction and guidance. Furthermore, since initiative based on interest was not part of their educational repertoire, students found it difficult to engage in learning activities that did not have a direct consequence in the form of a grade.

In conclusion, this case study demonstrated that, while the Montessori principles incorporated into this course showed promise, successfully changing the paradigm in higher education requires efforts beyond a single course. Truly shaping undergraduate education for the 21st century involves broad and integrated change across departments and even universities to empower students to take control of their own learning, to be inspired and motivated by their own intrinsic values, and to expand their thinking beyond narrow expectations of textbook learning.

Limitations

As with any case study, limitations exist as compared to rigorous experimental research designs. However, the limitations of subjectivity, sample size, and contextualized findings also represent strengths of this approach. The nature of case study research leverages the long-term, intimate relationships possible with such a design. Even so, we acknowledge that this case study lacks an important element of diversity among participants. While the participants reflected the population of the marketing department at this university, the participants still reflect a stark lack of divergent voices from different races, cultures, genders, and neurodiverse backgrounds. The study was also limited because only one section of the course was offered and it met at 9:30 a.m. in the semester the research was conducted. Implementing these strategies when students may be more alert later in the day would certainly be something to consider exploring along with similar strategies with different groups of students in different types of courses across the business school and beyond.

Conclusion

The research problem addressed by this study relates to generating innovative pedagogical approaches to offer learner-centered approaches higher education. The objective of this study was to offer a new perspective on innovation in higher education pedagogy by exploring how Montessori principles can be applied in an elective upper-level undergraduate marketing analytics course. Results of the study suggest incorporating a Montessori approach into an undergraduate marketing course seems to show promise, so this case study provides a basis for future research exploring these practices as well as the recommendations for future course designs building on these findings. Continued innovation in higher education is crucial for preparing students for the challenges they will face in the workplace and in society. Montessori education offers a unique perspective for addressing many of the shortcomings identified in current approaches to undergraduate instruction and should continue to be explored for its potential to inspire innovation in higher education. Expanding the number of studies exploring innovative approaches in higher education pedagogy is important for the field to evolve and meet the changing needs of today's students.

New directions for research

Future research should not only explore the implementation of novel approaches in university classrooms but should also incorporate a variety of research designs, including rigorous experimental and quasi-experimental methods along with rich, contextualized qualitative studies to build a strong foundation supporting a paradigm shift in higher education pedagogy. New lines of research regarding applications of Montessori educational principles could extend not only to 4-year colleges and universities but also to vocational programs and programs for youth in out-of-school settings such as after school programs, enrichment programs, and programs for incarcerated youth.

Data availability statement

The datasets presented in this article are not readily available because as a small case study, releasing participant data would risk easily identifying participants. Requests to access the datasets should be directed to AM, akmurray@ku.edu.

Ethics statement

The studies involving human participants were reviewed and approved by University of Kansas Human Subjects Committee. The patients/participants provided their written informed consent to participate in this study.

Author contributions

AM and MM contributed to the conception and design of the study. EP and KC provided background research and analysis for the theoretical framework. AM was the participant observer who collected the data and performed the analysis and wrote first draft of the manuscript. MM, EP, and KC wrote sections of the manuscript. All authors contributed to the manuscript revision, read, and approved the submitted version.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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