

PUTTING MARKETING ANALYTICS ON ICE (IN-CLASS EXERCISES): FOSTERING AUTONOMY AND MOTIVATION TO BUILD SELF-CONFIDENCE AND BELONGINGNESS

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ABSTRACT

Purpose of the Study: Many functions in marketing analytics are premised on database management skills. New graduates are increasingly expected to possess these skills. However, students often shy away from database management because they lack confidence with what they perceive as math-based learning in isolation. However, they can develop self-confidence from active learning classroom exercises where they work on their own and are motivated to excel.

Method/Design and Sample: In-class exercises (ICEs) were conducted in two sections of an in-person graduate marketing database management course ($n = 73$) and assessed to determine their usefulness.

Results: Survey results provide evidence that the ICEs fostered autonomy and motivation for building self-confidence and a sense of belonging. A significant increase in final exam scores compared to sections that did not utilize ICEs also provides evidence as a direct measure of student learning.

Value to Marketing Educators: Marketing educators can have greater confidence in using ICEs to encourage continued marketing analytics skills attainment.

Keywords: marketing analytics, autonomy, motivation, self-confidence, belonging

INTRODUCTION

Students are hesitant to engage in marketing analytics because they are concerned about their ability to master the material and the potential embarrassment of looking incompetent in front of their peers (Peltier et al., 2021). Prior studies show that concerns with math lead to lower performance on math calculations, and as a result, marketing students have significantly less quantitative skills than other business majors (Bhowmick et al., 2017; Tarasi et al., 2013). He et al. (2023) note that the situation is exacerbated by the misconception among many business students that careers in marketing only require soft skills. As a result, many marketing students avoid enrolling in quantitative marketing classes altogether (Graham et al., 2020). When marketing analytics are part of a required course, math anxiety fears often manifest as students not even trying and simply avoiding any concepts related to math or quantitative analysis, even though the need for marketing graduates to be competent in these areas is readily apparent (Cappuccitti et al., 2019; Flight, 2021; Honea et al., 2017).

One problematic area of marketing analytics is developing database management skills to access internal and external customer data, a foundation for marketing analytics (Kurtzke & Setkute, 2021). These skills are considered essential in many industries to meet anticipated growth projections (Bouchrika, 2023). Advances in active learning and flipped classrooms have addressed these concerns to a certain degree by having students consume content on their own and then spend class time engaging with concepts that require more attention (Vander Schee, 2007; Zainuddin & Perera, 2019). The idea is for instructors to use class time for students to apply concepts through case studies, group activities, or practice assignments with the instructor available for consultation, as needed (Gundala et al., 2018; Vander Schee, 2012).

An application of active learning is to approach student concerns with exercises that foster autonomy in problem solving and instill motivation to be successful. Over time students build self-confidence in their skills and overcome social fears as they also experience a sense of belonging (Judge et al., 2007). The classroom can provide a supportive environment where students work on in-class exercises independently

and then consult with their colleagues and instructor for affirmation. Repeating the process over a series of class sessions, or the entire course, helps students become comfortable with tackling short, semi-structured activities, similar to what they may experience on an exam or work project (Hamer, 2000). Knowing that they may be called upon during class adds accountability and independent preparation.

The objective of the ICEs is to motivate students to master database management skills on their own while building their self-confidence with a sense of belonging. This approach to student learning should enhance student familiarity and competence with database management using Structured Query Language (SQL). SQL is a standard language to create, modify, and access databases. Knowing how to access data is a necessary precursor to marketing analytics.

It is also important to establish the effectiveness of this pedagogical approach using direct measures of student learning (Bacon, 2011). Quantitative items on a comprehensive exam, for example, can be used as a direct measure assessment when it comes to marketing analytics (Killian, 2023). Indirect measures of student learning can address whether students enjoyed the learning process and recommend it for other students in the future. Student dispositions, namely autonomy, motivation, self-confidence, and a sense of belonging can assess the likelihood that students will continue learning database management skills independently after the course is over.

This paper provides a literature review of relevant theory, followed by the ICE description, method of analysis, results, discussion, and finally limitations and suggestions for future research.

LITERATURE REVIEW

This study is grounded in the literature related to activity learning in marketing education, as well as theory addressing student dispositions, and the utility of marketing analytics. This study incorporates ICE database management activities as the active learning independent variable to assess student learning, both direct and indirect measures. The current research also measures student dispositions intended to prepare students for learning marketing analytics in the future on their own. This section introduces the relevant concepts under investigation in this study starting with active learning, then autonomy, motivation, self-confidence, sense of belonging, and finally marketing analytics.

Active Learning

Active learning has been utilized in marketing education for some time via role-playing, case studies, and games (Hamer, 2000). With active learning, students engage with the classroom material in a meaningful way to foster understanding and connection (VanMeter & Vander Schee, 2021). The idea is for students to master course concepts so they can make appropriate application in different circumstances in the future from those present when the material was presented to them (Vander Schee, 2011). Experiential learning builds on the concept of continued active learning by having students apply knowledge to real-world or closely simulated situations (Ackerman & Hu, 2011). This is the case with ICEs described in this paper in that students are presented with progressively more challenging data queries in-class, like what they will experience when accessing data for marketing analytics post-graduation.

Direct measures of student learning will assess whether gains in classroom enjoyment are commensurate with demonstrated evidence of student learning (Elbeck & Bacon, 2015). It is also worth investigating whether students enjoy this classroom approach because they are more likely to engage in the process if they find it useful and enjoyable. Fostering student dispositions associated with continued learning beyond the classroom are noteworthy as well because advances in technology and remote work will likely position students to continue developing their skills in marketing analytics on their own (Kurtzke & Setkute, 2021).

Autonomy

Autonomy is one of three psychological needs identified in self-determination theory that provide the conditions needed for psychological growth, integrity, and well-being (Deci & Ryan, 2000). Prior studies in marketing education have considered autonomy as an essential component in giving students a sense of choice, empowerment, and achievement from completing tasks on their own (Rayburn et al., 2018). Being successful on one's own also sets the foundation for intrinsic motivation to accept the challenge of new educational experiences without the direct guidance of an instructor. Working independently also enhances student engagement and fosters self-confidence in approaching future tasks (Niemic & Ryan,

2009). In other words, students are motivated to succeed when they have a history of being successful.

In this study, the autonomy dependent variable is defined as *having control over one's own learning*. With this kind of self-learning, students perceive that they can master the tasks presented to them, which is common in a flipped classroom environment (Zainuddin & Perera, 2019). When it comes to the content of the activities, their sense of autonomy is enhanced when the exercises have out-of-classroom application, such as tying directly to skill attainment or job function (Bicen & Laverie, 2009). Activities can be checked for accuracy in student groups, without the assistance of the instructor, helping to establish autonomy among team members (Zainuddin & Perera, 2019). The study by Boyer et al. (2014) concluded that students who take ownership of their learning on their own, and with other students, are better prepared for the workplace when it comes to anticipating the needs of the organization and creating value for the organization.

Motivation

In line with autonomy, having a sense of control over one's own learning fosters motivation (Ryan et al., 2021). Motivated students look for challenges and strive to develop their skills and knowledge base, even when there are no tangible rewards offered to do so (Di Domenico & Ryan, 2017). They engage in activities because they find them interesting and satisfying to complete, while expanding their ability to complete tasks and apply knowledge to new situations (Deci & Ryan, 2000). Personal relevance is an essential component in fostering intrinsic motivation (Yuksel et al., 2021). Students are less inclined to engage in activities that they perceive as having little value in the long-term. Therefore, in-class activities should be crafted to align with tasks likely to be encountered in the workplace post-graduation.

In this study, the motivation dependent variable is defined as *self-reported effort*. Although extrinsic motivation manifests from earning rewards or avoiding negative consequences, students often develop intrinsic motivation from autonomy (Van Nuland et al., 2012). The premise is that when students do not feel compelled to complete tasks, they are more likely to engage for personal benefits, such as gaining technical competence. However, there are times when external rewards are needed as well to encourage student motivation, such as a favorable peer review or a high grade on an exam (McCartan et al., 2023). Peña et al. (2024) note incentives, including competitions, can provide external motivation to encourage student participation.

Taken together, developing and utilizing an innovative in-class pedagogical approach can enhance student motivation and engagement (MacDermott et al., 2023). It is anticipated that the ICEs under consideration in this study will foster autonomy and motivation because they address database management skills needed for future employment, students do not earn credit for completion, and students will be tested on mastering the skills on the final exam in the course.

Self-confidence

As marketing functions increase their online operations, new graduates will be expected to take greater ownership of their learning (Dewald & Vander Schee, 2022). As a result, students will need confidence to work independently. Students gain confidence by demonstrating competence in making practical application of marketing concepts (McDougal et al., 2021). Application may be difficult to discern in a one-time assessment, however, completing industry-relevant tasks in-class can mimic the marketing analytics workplace environment. Although this approach may benefit all students, the results of a study by Veeck et al. (2023) indicate that students with low self-confidence in their abilities in general appreciate having class time dedicated to practicing quantitative exercises.

In this study, the self-confidence dependent variable is defined as *feeling capable of achieving goals*. Building skills needed in the workplace builds self-confidence resulting in better performance of those skills (Hartley et al., 2019). Marketing simulations have been used to build student self-confidence to address numeracy skills (Brennan & Vos, 2013). Quantitative in-class activities are similar to simulations in that they mimic real-life business situations, particularly when applied to database management. Moreover, a study by Daniels et al. (2024) found students gain confidence in quantitative reasoning with repeated practice exercises that increase in complexity over time. As a result, autonomous, motivating, and progressive challenging learning activities should foster student self-confidence (Humphrey et al., 2021).

Sense of Belonging

Belonging is a foundational human motivation for emotional wellness and cognitive processing

(Baumeister & Leary, 1995). Institutions of higher education cultivate belongingness to heighten student satisfaction with the college or university (Matarranz et al., 2024). The same concept applies at the micro level of each individual course that students complete (Mahoney et al., 2022). Courses that allow students to work together encourage foster social persuasion towards a mindset of success when it comes to quantitative analysis (Veeck et al., 2023). Moreover, having groups of students work on exercises in class can minimize the time pressure associated with homework assignments and put students in a more relaxed physiological and psychological state to foster learning analytical concepts.

In this study, the sense of belonging dependent variable is defined as *feeling accepted, included, and supported*. Participation and a sense of belonging can be increased by using technology to connect students to the content and to each other (Spencer et al., 2020). However, belongingness should be tied to learning activities that foster confidence to operate independently in the future, and not just feel supported in the classroom (Yorke, 2016). Therefore, autonomous and motivating learning activities should provide a sense of belonging (Adi Badiozaman et al., 2020).

Marketing Analytics

In the new era of data and analytics driven approaches to doing business, marketers are expected to understand and work with databases as a foundation for marketing analytics (Kurtzke & Setkute, 2021). Therefore, marketing graduates are increasingly required to take more technical courses that were previously limited to computer science majors. Although not every marketer needs advanced quantitative analysis skills to manage databases, they do need the technical competence to access the data contained within databases. This observation is not new in that Weathers & Aragón (2019) highlight managing datasets and analyzing data as core competencies needed for marketing analytics. Therefore, database management activities are used as ICEs as the independent variable in this research, as described in the next section.

DATABASE MANAGEMENT ACTIVITIES

This section provides an overview of database management skills attainment. It describes the main components of the database management course and then outlines the preparation, execution, and assessment for the ICEs as the independent variable in this study.

Context

Due to their varying experiences, graduate marketing students lack a common background, and the instructor cannot make any assumptions about their prior training or skills. Therefore, instructors need to use an approach to learning database management skills that work for all graduate marketing students. This is true whether teaching classes in-person or online. However, it is easier to assess student preparedness while instructing face to face by asking questions or administering a preliminary non-credit assessment. Either way, the instructor must start from a position of basics rather than diving into advanced topics at the outset.

The first step in performing marketing analytics is to access data that is stored in enterprise databases. This requires training students in Relational Database Technology (RDT) and Structured Query Language (SQL). SQL is used to access data from relational databases such as Oracle and Teradata. As such, a course on Database Management and SQL is a required foundation for marketing analytics. This ends up being a very computer science-oriented course that teaches the principles of relational database design and SQL programming to students who have very little background in these areas. Students face a double pronged challenge of learning database concepts and programming in a single course. This approach follows the recommendation by LeClair (2018) to connect learning to future professional experience.

The course has two modules. The first module covers the principles of databases and their management, the fundamentals of the relational data model and the design of relational databases. The second module covers SQL programming which is used to create and extract data in a relational database. In this paper, we describe the process to teach SQL while a similar approach is also employed to teach module one topics such as Entity Relational Modeling and Normalization to marketing graduate students.

Preparation

A key aspect of teaching complex technical aspects to students from a non-technical background is to

break concepts into smaller bite sized chunks (Humphries & Clark, 2021). The objective is to use a *building blocks* approach where several small pieces put together will make the whole concept. For example, consider teaching the basic SELECT statement used to write queries in SQL.

SELECT colnames FROM table WHERE condition ORDER BY colnames

The full SELECT query as shown in the example above, can be broken down into a sequence that consists of each individual component or block of the query (i.e., the SELECT, FROM, WHERE, and ORDER BY clauses). The students are taught each clause as a block, making it easier for them to assimilate it. Once they understand the workings of the individual blocks, it is put together to write out the full query.

The ICE fits inside this framework. Each block will have several ICEs, ideally one for each subtopic within a block. The instructor is required to identify where to place the ICEs in discussion. It helps to create a small toy database schema that can be used throughout the course, as shown in the example below.

Restaurant (rno, rname, rcity)
Menuitem (rno, mino, miname, miprice)
Guest (gNo, gName, gAddress)
Order (gno, rno, mino, date)

Execution

Students are presented with an ICE pertaining to the topic just discussed. The whole class is given a few minutes to work out the exercise and then the instructor randomly calls a student to come up to the white board to work out the exercise. In an online format, students can be encouraged to use the Whiteboard function in Zoom or the Annotate function to write on the slides shared by the instructor. In both formats, the objective is to have the whole class see and participate in the ICE.

The whiteboard is treated as a safe space where the student answers the ICE to the best of their knowledge. It is okay to make mistakes, which in turn, leads to a learning moment for the whole class. It is also imperative that the instructor come across as approachable so that students feel comfortable asking questions of the instructor. Students in the audience are also encouraged to discuss the query or pose alternative solutions they think work for the ICE question. These create valuable learning experiences for the students to further enhance their knowledge while getting live feedback from the instructor.

The following are examples of ICEs that start as simple exercises and progressively become more complex as the class period progresses.

1. *List all restaurants.*
2. *List all restaurants in Chicago.*
3. *List all guests from Chicago, in ascending order of their names.*
4. *List all menu items with a price below \$20.00.*
5. *List all menu items with a price below \$20.00, in descending order of price.*
6. *List all menu items with a price below \$20.00 in Chicago, in descending order of price.*

Ideally, each block should have at least one ICE to reinforce the topic covered in the block. Each ICE takes 2 to 5 minutes, depending on the complexity of the topic. Initial SQL topics, such as the SELECT statements described above, will take longer as students start the initial learning curve. The ICEs should progressively take less time as students become more familiar with the material. Since the ICEs vary in length of time, it is critical to structure the course in a way that the material is sufficient for the duration of the class yet leaves time for the ICEs and associated discussion.

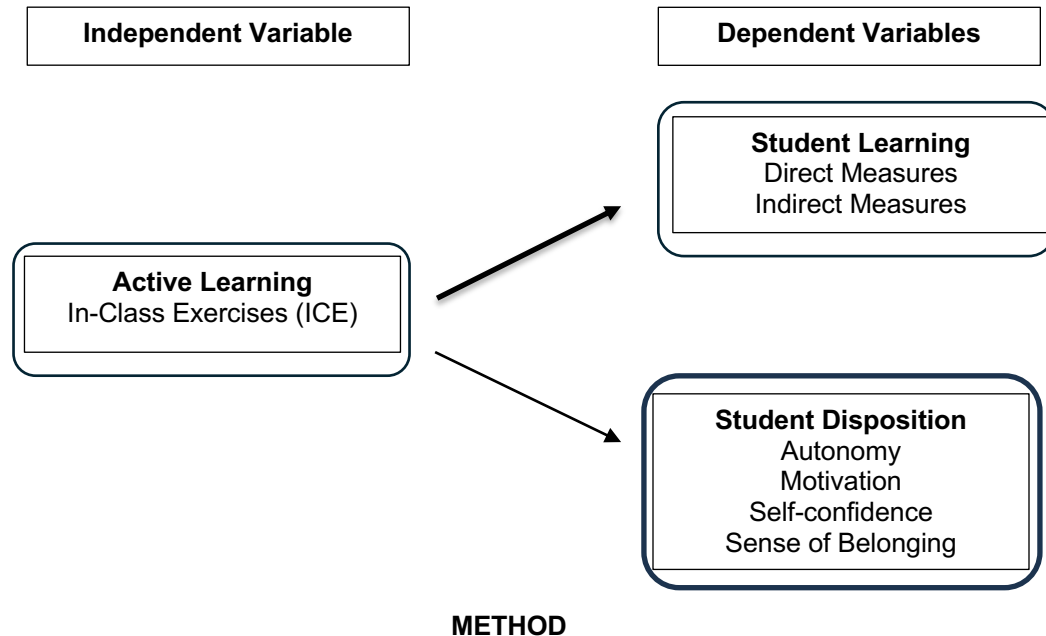
Assessment

There are no grades assigned in the course for the ICEs. The intent is to allow students to make mistakes without having to worry about it affecting their grade. Nevertheless, the possibility of coming up in front of a class and working out the query motivates students to come to class prepared, pay attention in class, and build confidence for independent learning in the future. Moreover, the final exam in the course is primarily made up of database management queries using SQL. Thus, there is additional motivation to excel in preparation for the final exam.

CONCEPTUAL MODEL

The relationship between the independent variable and dependent variables are noted in the conceptual model (see Figure 1).

Figure 1. Conceptual Model



This section presents information regarding the steps taken to execute the study with the ICEs as the independent variable in this research. It describes the sample used for this research as well as the measures assessed in the student survey and final assessment in the course as dependent variables in the study.

Sample

The previously described ICEs were conducted at a private urban university in the Midwest, USA. They were utilized in two sections of a graduate marketing database management course with approximately the same number of students in each section. The two sections of the course were taught in-person by the same instructor over a 16-week semester. Of the 73 students in the course utilizing the ICEs, 68 students completed the survey administered after the last ICE for a 93.1% response rate.

Measures

The Institutional Review Board at the host institution approved the study and data collection process before the semester in which the two sections of the course were taught. Students were surveyed after the final ICE. Responses were collected using a scale from 1 (*strongly disagree*) to 5 (*strongly agree*) for all measures. Students were also asked to indicate their age, gender, and race as demographic variables. The survey addressed social desirability through anonymized responses in the survey software. Final exam scores were also recorded as a direct measure of student learning. These scores were compared to a section of the same course from a prior semester that did not utilize the ICEs as a dependent variable direct measure of student learning.

The survey assessed the perception students regarding the usefulness of the activities as a dependent variable indirect measure of student learning. Students were asked to rate their level of agreement with survey items that were adopted from Syrdal et al. (2023) and Fedesco et al. (2019) concerning perceived effectiveness and learning of the ICEs. Student disposition was measured by scales already established in the literature. A 3-item scale from Bicen & Laverie (2009) measured autonomy. The 3-item scale for motivation (i.e., self-reported effort) was utilized from Plant & Ryan (1985). Self-confidence and sense of

belonging were measured by scales from Humphrey et al. (2021) and Yorke (2016) using 4-items and 5-items respectively.

Exploratory factor analysis was conducted to assess each factor for convergent validity using varimax rotation based on eigenvalues greater than 1.0. Four factors emerged, explaining 78.2% of the variance. Cronbach alpha scores for all factors (sense of belonging = .91, self-confidence = .91, autonomy = .87, motivation = .74) exceeded the .70 benchmark recommended by Nunnally (1978), thus establishing internal validity. Table 1 shows the results of the rotated component matrix for the four factors along with corresponding coefficient alpha scores.

Table 1. Exploratory Factor Analysis Rotated Component Matrix for ICE Measures

Measurement Items	Factors			
	Sense of Belonging ($\alpha = .91$)	Self-confidence ($\alpha = .91$)	Autonomy ($\alpha = .87$)	Motivation ($\alpha = .74$)
I have found this course to be welcoming.	.926			
I am glad I am in this course.	.875			
Being in this course is an enriching experience.	.778			
I am shown respect by the other people in this course.	.725			
I felt confident using ICE to understand marketing analytics in the real world.		.890		
I felt confident using ICE as a substitute for real-world experience.		.850		
I felt confident leveraging ICE for my career development.		.772		
I felt confident using ICE as an assignment.		.765		
My performance in ICE was determined by things I could control.			.879	
It was under my control to do well in ICE.			.876	
I had freedom to choose how I performed in ICE.			.807	
I put a lot of effort into ICE.				.825
I did not try very hard to do well on ICE. (Reverse).				.785
It was important to me to do well on ICE.				.718

All individual weights achieved the recommended threshold of .70 (Nunnally, 1978) as well as exhibiting minimal cross loadings. Common method bias was assessed in the EFA using Harman's single-factor method (Fuller et al., 2016). The single factor explained 45% of the variance suggesting insignificant common method variance.

RESULTS

Of the respondents, 35 (51.5%) were female. The average age was 25.3 ($SD = 2.67$). Most self-identified as Asian (85.2%), with the balance identifying as Black (5.9%), White (1.5%), and Other (7.4%). Only 1 (1.5%) student indicated being Spanish, Hispanic, or Latino.

Direct Measures of Student Learning

Direct measures of student learning consider task performance where mastery of the task reflects having learned the material on which the task is based (Elbeck & Bacon, 2015). The task can be achieving a skill, demonstrating knowledge attainment, or displaying an attribute, to name a few. A concrete measure of task performance is when students are asked to respond to prompts to execute with a computer interface to generate the desired outcome. Therefore, the final exam in the course was composed almost entirely of questions where students had to provide the code needed to solve queries, like the ICE experiences. The exams were timed at 55 minutes with 70 questions and students had to complete them independently in-person using their laptops with no outside aides. Assessment of student learning was compared over two semesters of the course. The first time was with a traditional classroom approach without ICEs and the

second was identical to the first but with ICEs incorporated in the course. Student characteristics over the two semesters were similar.

The results of the independent samples t-test comparing the final exam scores provide evidence that students perform at a higher level with ICEs ($m = 85.6$, $sd = 8.60$, $n = 73$) compared to without ICEs ($m = 81.9$, $sd = 6.94$, $n = 30$) in that the difference in final exam scores was significant, $t(101) = 2.297$, $p = .025$.

Indirect Measures of Student Learning

Indirect measures of student learning reflect student opinions or thoughts about their learning. Although they do not discern whether actual learning has taken place, they provide insight as to whether students perceived the activity to be useful and whether they enjoyed learning. Students who have positive feelings about the activity are more likely to engage with the learning process (Elbeck & Bacon, 2015). The results regarding student perceptions provide evidence for student agreement that the ICEs were effective and recommend it for future use. See Table 2.

Table 2. Student Perceptions of the In Class Exercises

Survey Item	<i>M</i> (<i>N</i> = 68)	<i>SD</i>
I am satisfied with ICE as an effective learning experience.	4.74	0.589
I highly rate using ICE as an effective learning experience.	4.71	0.648
I recommend using ICE in the course in the future.	4.79	0.612
I learned a lot from ICE.	4.57	0.654
I understood the content from ICE.	4.71	0.624

Student Disposition

This study focused on elements grounded in self-determination, self-efficacy, and belongingness theories to assess student disposition after completing the ICEs. Therefore, the survey included measures for sense of belonging, self-confidence, autonomy, and motivation. Results of the composite scores indicate students *agreed* to *strongly agreed* on each of the measures. See Table 3.

Table 3. Post-In Class Exercises Measures

Construct	<i>M</i> (<i>N</i> = 68)	<i>SD</i>
Sense of Belonging.	4.63	0.631
Self-confidence.	4.18	0.850
Autonomy.	4.44	0.711
Motivation.	4.22	0.814

Summary

Direct measures of student learning demonstrate an increase in student achievement because of using the ICEs in the course. Students also perceive the ICEs to be effective, learned from them, and recommend them for the future. Taken together, the results provide evidence for the ICEs fostering autonomy and motivation to encourage self-confidence and a sense of belonging.

DISCUSSION

Employers believe that new graduates do not have requisite skills for success in the marketing profession (Bacon, 2017). This is particularly the case for the skills needed in marketing analytics as database management. The problem is compounded by the aversion of many marketing students to math-based or quantitative analysis. Moreover, as more marketing functions move to remote or virtual execution, new graduates will be expected to learn on their own. These challenges can be addressed in class with activities designed to motivate students to work independently and gain confidence in marketing analytics while feeling good about the process with a sense of belonging.

This study utilized ICEs to help students to learn database management skills. This approach used basic SQL queries with progressively more complex problems. ICEs were used as an opportunity for students to solve problems on their own during class time by applying the concepts just covered in the course. Students were given time to confer with their classmates and then demonstrate their mastery of concepts by writing their solution on the class white board. Regardless of the accuracy of the suggested

query code, other students in the course could learn by providing alternative answers or having the instructor affirm the efficacy of each approach.

Improved exam scores provide evidence for the ICEs being effective at enhancing the database management skills of students as a direct measure of student learning. This is outcome is inconsistent with the results found by Dorie et al. (2021) where student performance increased when students received instant feedback on quantitative skills in a lecture-based retail math course. In that study, students preferred professor in-person instruction with immediate interaction with the instructor and application exercises done independently after class. This contrasted with an active learning setting where students watched video lectures on their own and then completed worksheets, case studies, and discussion questions during class time.

The results of this study provide evidence for students perceiving the ICEs to be effective in enhancing their learning and recommending them in the future. The results of this study show that students found the ICEs to foster autonomy and motivation in their learning. This finding is consistent with Zainuddin and Perera (2019) where students are motivated to achieve their goals within a team setting. However, in this study students were also encouraged to work on their own and demonstrate their mastery of skills by sharing their solutions with the whole class. This additional step provided motivation for adequate preparation and review as well as accountability.

The ICE approach harnessed the benefits of both a flipped classroom and active learning environment, absent in the Dorie et al. (2021) study. Students came prepared to class having read the assigned material for the relevant database management topic. The instructor then worked through examples in-person during class time. Students then worked through progressively more advanced ICEs with access to the instructor while working on their own and in teams. They received immediate feedback from the instructor and the entire class when disclosing their proposed solutions. This approach made the experience conducive for autonomy and motivation as suggested by the evidence present in the survey responses.

Survey results provide evidence for the students perceiving the ICEs to build their self-confidence. This finding builds on the work of Hartley et al. (2019) where students gain confidence from completing tasks they know they will be expected to perform in the workplace. Taken together with the motivation to work autonomously better equips students to be successful in a remote environment. Initial successes with simple blocks can help students feel more confident about tackling more complex queries later on in the course. Again, the chunking approach is at play here where students are challenged to be successful at each stage of their learning in the course.

The results of this study also provide evidence for the students experiencing a sense of belonging using the ICEs. This may seem counterintuitive to autonomy, however, having the support to work independently and then within a group setting makes sense in that students know they have access to resources (i.e., the instructor and other students) for enhanced learning. This reinforces their motivation and self-confidence to develop their skills in marketing analytics as database management. It also provides an accountability mechanism with classmates to come prepared to learn together during class time.

Developing an ICE for each individual block, for query building for example, can be time consuming, however they can be used again in future courses, cutting down on prep time with repeat course offerings. They are adaptable for online synchronous learning environments and can be applied to undergraduate courses in database management or marketing analytics. Although students are encouraged to work on the ICEs on their own, some students may choose to work with a partner or group initially, to build confidence in their skills development. However, all students should be encouraged over time to work independently to replicate the work setting in the future.

LIMITATIONS AND FUTURE RESEARCH

Direct measures provide evidence suggesting the ICEs were effective in enhancing student learning. Indirect measures provide evidence for students highly rating the ICEs and recommending them as part of the course in the future. The results of the analysis also show the ICEs to be effective at fostering autonomy and motivation to help students develop self-confidence and a sense of belonging in their pursuit of learning database management skills.

Some things should be kept in mind when applying the ICEs to other settings. The ICEs were utilized at one institution with one instructor with a graduate in-person course over two semesters. Other insights might come to light with a larger sample size or greater representation from other institutions and instructors.

The lack of diversity in the student sample could also have an influence on the results because it was not necessarily representative of the demographic characteristics of marketing graduate students in general.

Future research investigating the influence on students beyond completing the ICEs should shed light on whether the student dispositions or mastery of database management skills carry to future courses in marketing analytics or database management. It would be interesting to see if students continue enhancing their skills throughout the database management course (Vander Schee, 2007a) and then on their own after graduation, as part of their autonomy and motivation for learning. Research in this area may confirm whether motivation is intrinsic and is strong enough to foster independent professional development.

Another line of inquiry could focus on personality traits to ascertain whether perspectives and attitudes students bring with them to the course could provide a better understanding of the outcomes gleaned from the ICEs (Story et al., 2020). Therefore, assessing student motivation and self-confidence in advance of the course, for example, may help discern if the gains are related to student personality (Hughes et al., 2020). Finally, utilizing the ICEs in undergraduate and online synchronous courses could examine the influence of course level and course modality.

REFERENCES

- Ackerman, D. S., & Hu, J. (2011). Effect of type of curriculum on educational outcomes and motivation among marketing students with different learning styles. *Journal of Marketing Education, 33*(3), 273–284. <https://doi.org/10.1177/0273475311420233>
- Adi Badiozaman, I. F. B., Leong, H., & Jikus, O. (2020). Investigating student engagement in Malaysian higher education: A self-determination theory approach. *Journal of Further and Higher Education, 44*(10), 1364–1378. <https://doi.org/10.1080/0309877X.2019.1688266>
- Bacon, D. R. (2011). Comparing direct versus indirect measures of the pedagogical effectiveness of team testing. *Journal of Marketing Education, 33*(3), 348–358. <https://doi.org/10.1177/0273475311420243>
- Bacon, D. R. (2017). Revisiting the relationship between marketing education and marketing career success. *Journal of Marketing Education, 39*(2), 109–123. <https://doi.org/10.1177/0273475317710061>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- Bhowmick, S., Young, J. A., Clark, P. W., & Bhowmick, N. (2017). Marketing students' mathematics performance: The mediating role of math anxiety on math self-concept and math self-efficacy. *Journal of Higher Education Theory & Practice, 17*(9), 104–117.
- Bicen, P., & Laverie, D. A. (2009). Group-based assessment as a dynamic approach to marketing education. *Journal of Marketing Education, 31*(2), 96–108. <https://doi.org/10.1177/0273475309334037>
- Bouchrika, I. (2023, April 4). *Database Management Careers: 2024 Guide to Career Paths, Options & Salary*. Research.Com. <https://research.com/careers/database-management-careers>
- Boyer, S. L., Edmondson, D. R., Artis, A. B., & Fleming, D. (2014). Self-directed learning: A tool for lifelong learning. *Journal of Marketing Education, 36*(1), 20–32. <https://doi.org/10.1177/0273475313494010>
- Brennan, R., & Vos, L. (2013). Effects of participation in a simulation game on marketing students' numeracy and financial skills. *Journal of Marketing Education, 35*(3), 259–270. <https://doi.org/10.1177/0273475313482928>
- Cappuccitti, A., Gunn, F., & Lee, S. H. (2019). Establishing knowledge and cultivating talent via experiential learning: The case of the fashion retail lab. *Journal for Advancement of Marketing Education, 27*(2), 1–9.
- Daniels, R. A., Appenzeller Knowles, K., Lindner, A., & Naasz, E. (2024). Spiral pedagogy: Developing a quantitative habit of mind in marketing students. *Marketing Education Review, 34*(2), 121–129. <https://doi.org/10.1080/10528008.2024.2340575>
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01
- Dewald, F. P., & Vander Schee, B. A. (2022). Financial services digital badging: Applying self-determination theory to student motivation. *Journal of Financial Education, 48*(1), 47–58. <https://www.jstor.org/stable/10.2307/48748391>
- Di Domenico, S. I., & Ryan, R. M. (2017). The emerging neuroscience of intrinsic motivation: A new frontier

- in self-determination research. *Frontiers in Human Neuroscience*, 11, 145. <https://doi.org/10.3389/fnhum.2017.00145>
- Dorie, A., Loranger, D., & Hurst, J. (2021). It all adds up: Impact of the flipped classroom approach related to achievement, student satisfaction, self-efficacy, anxiety, and optimism in a retail math course. *Journal for Advancement of Marketing Education*, 29(2), 12–20.
- Elbeck, M., & Bacon, D. (2015). Toward universal definitions for direct and indirect assessment. *Journal of Education for Business*, 90(5), 278–283. <https://doi.org/10.1080/08832323.2015.1034064>
- Fedesco, H. N., Bonem, E. M., Wang, C., & Henares, R. (2019). Connections in the classroom: Separating the effects of instructor and peer relatedness in the basic needs satisfaction scale. *Motivation and Emotion*, 43(5), 758–770. <https://doi.org/10.1007/s11031-019-09765-x>
- Flight, R. L. (2021). Linking practitioner dilemmas and research metrics across an integrated marketing curriculum. *Journal of Marketing Education*, 43(3), 317–332. <https://doi.org/10.1177/02734753211017173>
- Fuller, C. M., Simmering, M. J., Atinc, G., Atinc, Y., & Babin, B. J. (2016). Common methods variance detection in business research. *Journal of Business Research*, 69(8), 3192–3198. <https://doi.org/10.1016/j.jbusres.2015.12.008>
- Graham, K. W., Achenreiner, G., McDermott, M., & Crosby, E. (2020). Is what students want what they really need? A values view of undergraduate marketing elective course offerings. *Marketing Education Review*, 30(3), 140–149. <https://doi.org/10.1080/10528008.2020.1773277>
- Gundala, R. R., Singh, M., & Cochran, T. K. (2018). Perceptions of integrated experiential learning of graduate marketing students. *Journal of the Scholarship of Teaching and Learning*, 18(2), 74–89. <https://doi.org/10.14434/josotl.v18i2.22498>
- Hamer, L. O. (2000). The additive effects of semi-structured classroom activities on student learning: An application of classroom-based experiential learning techniques. *Journal of Marketing Education*, 22(1), 25–34. <https://doi.org/10.1177/0273475300221004>
- Hartley, P., Routon, P. W., & Torres, L. (2019). The skills marketing majors believe they acquire: Evidence from a national survey. *Journal of Marketing Education*, 41(3), 202–214. <https://doi.org/10.1177/0273475318757282>
- He, Y., Alexander, J. F., Nikolov, A., & Chen, R. A. (2023). I was told there would be no math: Marketing students' misconceptions of the career field impede enrollment interest in quantitative courses. *Marketing Education Review*, 33(3), 178–189. <https://doi.org/10.1080/10528008.2022.2067778>
- Honea, H., Castro, I. A., & Peter, P. (2017). Evidence items as signals of marketing competencies and workplace readiness: A practitioner perspective. *Journal of Marketing Education*, 39(3), 145–161. <https://doi.org/10.1177/0273475317724845>
- Hughes, E. K., Slotter, E. B., & Lewandowski, G. W. (2020). Expanding who I am: Validating the self-expansion preference scale. *Journal of Personality Assessment*, 102(6), 792–803. <https://doi.org/10.1080/00223891.2019.1641109>
- Humphrey, W., Laverie, D., & Muñoz, C. (2021). The use and value of badges: Leveraging Salesforce Trailhead Badges for marketing technology education. *Journal of Marketing Education*, 43(1), 25–42. <https://doi.org/10.1177/0273475320912319>
- Humphries, B., & Clark, D. (2021). An examination of student preference for traditional didactic or chunking teaching strategies in an online learning environment. *Research in Learning Technology*, 29, 1–12. <https://doi.org/10.25304/rlt.v29.2405>
- Judge, T. A., Jackson, C. L., Shaw, J. C., Scott, B. A., & Rich, B. L. (2007). Self-efficacy and work-related performance: The integral role of individual differences. *Journal of Applied Psychology*, 92(1), 107–127. <https://doi.org/10.1037/0021-9010.92.1.107>
- Killian, G. (2023). Improving quantitative competency: Integrating math elements into marketing courses. *Marketing Education Review*, 33(2), 99–106. <https://doi.org/10.1080/10528008.2023.2196957>
- Kurtzke, S., & Setkute, J. (2021). Analytics capability in marketing education: A practice-informed model. *Journal of Marketing Education*, 43(3), 298–316. <https://doi.org/10.1177/02734753211042404>
- LeClair, D. (2018). Integrating business analytics in the marketing curriculum: Eight recommendations. *Marketing Education Review*, 28(1), 6–13. <https://doi.org/10.1080/10528008.2017.1421050>
- MacDermott, R., Mornah, D., & MacDermott, H. (2023). The MUSIC model of academic motivation in action: Revising a principles of marketing course using motivating students by design. *Journal for Advancement of Marketing Education*, 31(2), 1–15.

- Mahoney, B., Kumar, J., & Sabsabi, M. (2022). Strategies for student belonging: The Nexus of policy and practice in higher education. *Student Success*, 13(3), 54–62. <https://doi.org/10.5204/ssj.2479>
- Matarranz, J. L., García-Madariaga, J., & Carvajal, M. (2024). Approach to the sense of belonging: Construct for the marketing of entrepreneurship in higher education. *International Entrepreneurship and Management Journal*. <https://doi.org/10.1007/s11365-024-00974-6>
- McCartan, A., Cummins, D., Morgan, M., & Joseph-Richard, P. (2023). Exploring students' motivation to participate in entrepreneurial marketing education. *Journal of Marketing Education*, 45(3), 278–295. <https://doi.org/10.1177/02734753231178501>
- McDougal, E. R., Syrdal, H. A., Gravois, R., & Kemp, A. F. (2021). The power of story: Using storytelling to increase students' confidence and competence in applying marketing concepts. *Marketing Education Review*, 31(2), 119–124. <https://doi.org/10.1080/10528008.2020.1853573>
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, 7(2), 133–144. <https://doi.org/10.1177/1477878509104318>
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.
- Peltier, J. W., Chennamaneni, P. R., & Barber, K. N. (2021). Student anxiety, preparation, and learning framework for responding to external crises: The moderating role of self-efficacy as a coping mechanism. *Journal of Marketing Education*, 44(2), 149–165. <https://doi.org/10.1177/02734753211036500>
- Peña, P., Riley, J., & Davis, N. (2024). Increasing student engagement & contributions: Introducing the semester-long participation competition. *Marketing Education Review*, 34(2), 99–106. <https://doi.org/10.1080/10528008.2024.2337345>
- Plant, R. W., & Ryan, R. M. (1985). Intrinsic motivation and the effects of self-consciousness, self-awareness, and ego-involvement: An investigation of internally controlling styles. *Journal of Personality*, 53(3), 435–449. <https://doi.org/10.1111/j.1467-6494.1985.tb00375.x>
- Rayburn, S. W., Anderson, S. T., & Smith, K. H. (2018). Designing marketing courses based on self-determination theory: Promoting psychological need fulfillment and improving student outcomes. *Journal for Advancement of Marketing Education*, 26(2), 22–32.
- Ryan, R. M., Deci, E. L., Vansteenkiste, M., & Soenens, B. (2021). Building a science of motivated persons: Self-determination theory's empirical approach to human experience and the regulation of behavior. *Motivation Science*, 7(2), 97–110. <https://doi.org/10.1037/mot0000194>
- Spencer, R., Sinno, J., Hatfield, K., Biderman, M., Doria, N., & Numer, M. (2020). Exploring Top Hat's impact on undergraduate students' belongingness, engagement, and self-confidence: A mixed methods study. *Journal of Research on Technology in Education*, 52(2), 197–215. <https://doi.org/10.1080/15391523.2020.1722977>
- Story, W. K., Yukhymenko-Lescroart, M. A., & Deitz, G. D. (2020). Understanding student preferences: Improving outcomes in computer simulation experiential learning activities. *Journal for Advancement of Marketing Education*, 28(1), 13–25.
- Syrdal, H. A., Vander Schee, B. A., VanMeter, R. A., & Woodroof, P. J. (2023). The pedagogy of vulnerability and marketing education: Cultivating self-expansion in a time of separation. *Journal of Marketing Education*, 45(1), 91–100. <https://doi.org/10.1177/02734753211041743>
- Tarasi, C. O., Wilson, J. H., Puri, C., & Divine, R. L. (2013). Affinity for quantitative tools: Undergraduate marketing students moving beyond quantitative anxiety. *Journal of Marketing Education*, 35(1), 41–53. <https://doi.org/10.1177/0273475312460764>
- Van Nuland, H. J. C., Taris, T. W., Boekaerts, M., Martens, R. L., & Leuven, K. U. (2012). Testing the hierarchical SDT model: The case of performance-oriented classrooms. *European Journal of Psychology of Education*, 27(4), 467–482.
- Vander Schee, B. A. (2007a). Lasting effects of the first day in Principles of Marketing. *Journal for Advancement of Marketing Education*, 10(2), 70–76.
- Vander Schee, B. A. (2007b). Setting the stage for active learning: An interactive marketing class activity. *Marketing Education Review*, 17(1), 63–67. <https://doi.org/10.1080/10528008.2007.11488989>
- Vander Schee, B. A. (2011). Marketing feud: An active learning game of (mis)perception. *Marketing Education Review*, 21(1), 63–68. <https://doi.org/10.2753/MER1052-8008210109>
- Vander Schee, B. A. (2012). The influence of new product characteristics on rate of adoption: Increasing student comprehension with the *Bidding for Buyers* game. *Journal of Marketing Education*, 34(3), 251–

264. <https://doi.org/10.1177/0273475312455648>
- VanMeter, R. A., & Vander Schee, B. A. (2021). MerchMeNot: Applying merchandising concepts with active learning. *Marketing Education Review*, 31(2), 111–118. <https://doi.org/10.1080/10528008.2021.1871850>
- Veeck, A., Quareshi, Z. A., O'Reilly, K., Mumuni, A. G., MacMillan, A., Luqmani, Z., Luqmani, M., & Xie, H. (2023). Interventions to assess and address the self-efficacy of marketing students toward acquiring analytical skills. *Marketing Education Review*, 33(3), 211–225. <https://doi.org/10.1080/10528008.2022.2112533>
- Weathers, D., & Aragón, O. (2019). Integrating analytics into marketing curricula: Challenges and effective practices for developing six critical competencies. *Marketing Education Review*, 29(4), 266–282. <https://doi.org/10.1080/10528008.2019.1673664>
- Yorke, M. (2016). The development and initial use of a survey of student 'belongingness', engagement and self-confidence in UK higher education. *Assessment & Evaluation in Higher Education*, 41(1), 154–166. <https://doi.org/10.1080/02602938.2014.990415>
- Yuksel, M., Smith, A. N., Smith, R. S., Bicen, P., Wilson, E. J., & Weiner, J. (2021). Student interest in client-sponsored projects: The quest for engagement in marketing research courses. *Journal of Marketing Education*, 43(3), 354–370. <https://doi.org/10.1177/0273475321996797>
- Zainuddin, Z., & Perera, C. J. (2019). Exploring students' competence, autonomy and relatedness in the flipped classroom pedagogical model. *Journal of Further and Higher Education*, 43(1), 115–126. <https://doi.org/10.1080/0309877x.2017.1356916>
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