

DECISION SUPPORT-INDUCED ENGAGEMENT AND LEARNING TRENDS BY SIMULATION PHASE

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ABSTRACT

Based on learning and engagement theory, this disaggregated longitudinal trend analysis of decision support-induced engagement during Spring 2021 and Spring 2022 illustrates that early introduction of decision support system (dss) packages and freedom of choice results in increased dss usage tied to course assignments during each simulation phase. Further, the results support the hypothesis that user autonomy, relatedness, and competence foster dss-induced engagement, and that complex heavy workload demands under time pressure can be offset by the range of decision-making freedom and the amount of support provided. Based on prior participant suggestions, early dss introduction and support during the Spring 2022 semester resulted in increased online activity on both the simulation portal and course website. Participants downloaded and used more relevant dss packages tied to course assignments during each simulation phase. Enhanced understanding and application of strategic marketing concepts resulted in improved team presentations and individual strategic market plan reports.

INTRODUCTION

In line with the AACSB International Mission “to foster engagement, accelerate innovation, and amplify impact in business education,” (AACSB International, 2020) this paper reports on current efforts to (a) foster and track evidence on engagement, (b) accelerate innovation based on participant suggestions via co-creation of user-perceived value, and (c) amplify impact on learning via the early introduction and use of online graphics packages and Excel-based dss packages tied to simulation results. Specifically, this disaggregated trend analysis of decision support-induced engagement illustrates that simulation participants download and use more relevant online graphics and Excel-based decision support system (dss) packages, tied to course assignments during each simulation phase. Participants generate product positioning maps (PPMs) and product portfolio analysis (PPA) strategic market planning grids tied to the simulation results. They use 18 dss packages which extract pertinent information from the simulation results and facilitate analysis and informed decision-making in a problem-based learning (PBL) environment. The online graphics and dss packages enable participants to monitor, visualize, analyze, and improve their team performance relative to competitors thereby enhancing participant motivation, engagement, and learning.

Student engagement is considered an important predictor of student achievement (Handelsman, Briggs, Sullivan, & Towler, 2005). Engaged students are good learners and effective teaching stimulates and sustains student engagement (Pintrich & DeGroot, 1990; Skinner & Belmont, 1993). In addition, Skinner and Belmont (1993) found a reciprocal relationship between student engagement and teacher involvement. Yet, the definitions and measurement of student engagement are limited.

AACSB International asserts that student academic and professional engagement occurs when students are actively involved in their educational experience, in both academic and professional settings, and when they are able to connect these experiences in meaningful ways. AACSB International's bases for evaluating student engagement include giving appropriate attention and dedication to learning materials and maintaining engagement with these materials even when challenged by difficult learning activities. In addition, the curricula include approaches that actively engage and include all students in learning. Pedagogical approaches suitable for challenging students in this way include problem-based learning projects and simulations (AACSB International, 2013). Faced with challenging learning activities, students are willing to invest personal and internal energies regardless of task difficulty. Kahn (1990) asserts that this investment of resources results in physical, cognitive, and emotional dimensions of engagement that produce active, full performance as demonstrated by attendance, performance, and student products.

The primary purpose of this paper is to provide evidence of substantial increases in (a) observed cognitive, affective, and behavioral engagement by simulation participants that resulted from early dss introduction and support. Early dss introduction and support during Spring 2022, prompted by prior participant suggestions, resulted in increased relevant dss-usage tied to course assignments during each simulation phase, as well as understanding and application of strategic marketing concepts in the one-hour team presentation and individual strategic market planning (SMP) report at the end of the semester.

Decision support systems (dss) are defined as computer-based information systems that support the process of structuring problems, evaluating alternatives, and selecting actions for more effective management (Burns and Bush, 1991; Forgionne,

1988). Further, they are described as the hardware and software that permit decision-makers to deal with a specific set of related problems by providing tools that amplify a manager's judgment (Sprague, 1980).

A review of decision-making and dss research, includes a continuum of behavioral response perspectives on decision-making from instinctive response, guessing (Dane and Pratt, 2007), intuitive behavior (Dane and Pratt, 2007), insight (Hogarth, 2001), case-based reasoning, recognition-primed decision making (Klein, 1993), bounded rationality, to rational decision making (Adam, 2012).

Chornous et al. (2023) propose a multi-agent marketing dss comprising nine intellectual agents – market environment monitoring, data processing, marketing mix modeling, price policy support, portfolio management, strategic analysis, forecasting, customer segmentation, and customer classification, mirroring the dss packages used in this disaggregated longitudinal trend analysis study. Further, Wang and Wang (2022) contend that the use of a no-code development platform to create application software for a class instead of traditional computer programming languages can improve student learning.

In line with the above assertions, an array of dss packages tied to simulation results and course assignments are deployed based on the comments by scholars on the value of including dss software in computer simulations (Keys and Biggs, 1990; Teach, 1990; Gold and Pray, 1990; Wolfe and Gregg, 1989). In addition, the literature is replete with references to the use and impact of decision support systems with computer simulations (Affisco and Chanin, 1989, 1990; Burns and Bush, 1991; Cannon et al., 1993; Fritzsche et al., 1987; Grove et al., 1986; Halpin, 2006; Honaiser and Sauaia, 2006; Markulis and Strang, 1985; Mitri et al., 1998; Muhs and Callen, 1984; Nulsen et al., 1993, 1994; Palia, 1989, 1991, 2006, 2009; Peach, 1996; Schellenberger, 1983; Shane and Bailes, 1986; Sherrell et al., 1986; Wingender and Wurster, 1987; Woodruff, 1992).

DSS used with business simulations yields several benefits. These benefits include (a) greater depth of understanding of simulation activity with the resulting increase in planning (Keys et al., 1986), (b) in-depth understanding of quantitative techniques as students visualize the results of their applications, (c) sensitivity to weaknesses in techniques used, and (d) experience in capitalizing on their strengths (Fritzsche et al., 1987). Other benefits include (a) minimization of paperwork and errors, (b) error-free graphical representation of output, (c) a competitive tool with increasing value as the simulation progresses, and (d) potential for participants to create their own dss (Burns and Bush, 1991). In addition, dss enhances understanding of complex business relationships and provides additional value over time (Halpin, 2006). Further, they provide realism, relevance, literacy, flexibility, and opportunity for refinement (Sherrell et al., 1986).

Some authors contend that combining an active student-generated database in the form of a simulation game with a dss results in improved decision-making, leads to improved proactive rather than reactive strategic planning, and results in improved simulation game performance and enhanced learning (Muhs and Callen, 1984). Others report no support for the premise that dss usage improves small group decision-making effectiveness (Affisco and Chanin, 1989), but that dss usage to support manufacturing function decisions resulted in decreased manufacturing costs and increased “earnings/cost of goods sold” ratio in the second year of play (Affisco and Chanin, 1990).

Given the mixed results on decision-making effectiveness resulting from dss usage, this paper explores the effect of dss usage on engagement and learning. Specifically, does the early dss introduction in a simulation enhance engagement and learning? This paper provides evidence of accelerated engagement and consequent learning that results from the early introduction of dss, based on student suggestions.

First, a brief review of three salient models on academic engagement relative to job demands, control, support, and resources includes (a) Karasek (1979, 1982, 1990) Job Demand Control Support (JDCS) model, (b) Demerouti et al. (2001) and Baaker and Demerouti (2007) Job Demand Resources (JD-R) model, and (c) Argyris (1970) Organizational Development Intervention model.

Then, this longitudinal study provides behavioral engagement metrics for identical remote course offerings of comparable size, with the same course schedule, and instructor during the Spring 2021 and Spring 2022 semesters. Engagement metrics monitored daily include (a) page views, (b) visitors, (c) sessions, (d) online product positioning map (PPM) graphics, and product portfolio analysis (PPA) graphics generated on the simulation portal, and (e) downloads and usage of dss packages. The engagement metrics of 34 Spring 2021 participants and 37 Spring 2022 participants in identical Marketing Strategies courses, were monitored daily throughout both semesters.

Based on their course and simulation experience, Spring 2021 students suggested that dss packages be progressively introduced and demonstrated earlier in future semesters. Students are encouraged to access, download, and use the dss packages in their decision-making during the simulation competition. They provide evidence of dss package usage in their

weekly writing assignments (WWAs), 1-hour team presentation, and individual strategic market plan report at the end of the semester.

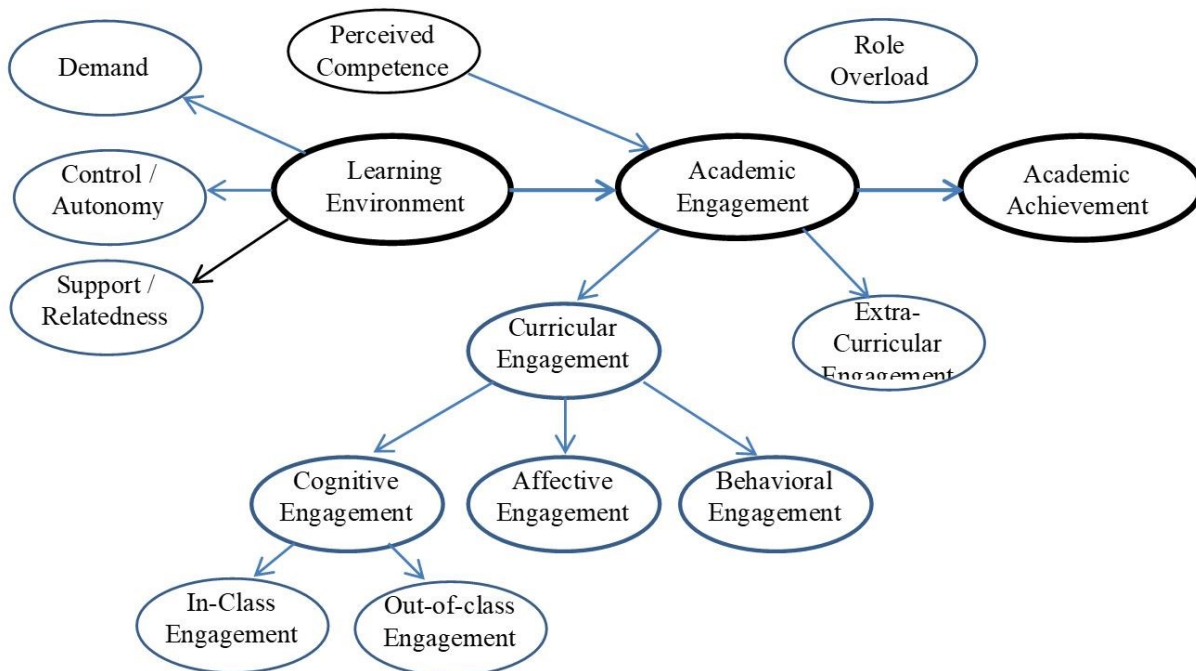
ACADEMIC ENGAGEMENT

Young (2010) reviews the definition and measurement of academic engagement and investigates environmental antecedents that foster or discourage each of the dimensions of engagement (see Exhibit 1). Curricular engagement represents engagement towards targets or objects related to teaching and learning pedagogies, while extra-curricular engagement refers to engagement towards targets or objects outside the classroom, such as student clubs, athletics, and musical events. Curricular (cognitive, affective, and behavioral) engagement refers to the intensity and emotional quality of students' involvement in nurturing and carrying out learning activities (Skinner, 1991).

Cognitive engagement accounts for the mental effort and psychological investment directed toward comprehending and mastering the academic task (Wehlage et al., 1989). Cognitive and self-regulatory strategies are used by students to monitor and guide learning (Pintrich & De Groot, 1990). Affective engagement refers to students' emotional reactions to the learning task, the content, and/or the learning context (Skinner & Belmont, 1993), as well as identification with school (Voelkl, 1997) and the liking or disliking of school (Epstein & McPartland, 1976). Behavioral engagement represents the effort, attention, and persistence of performing various learning activity behaviors such as class discussion, debate, role-playing, and short written exercises (Young, 2010). Accordingly, engagement is a multidimensional concept with cognitive, affective, and behavioral components (see Exhibit 1).

Academic engagement is also affected by the learning environment via decisions on (a) how well the material is presented, (b) which learning activities are used, and (c) what kinds of feedback are provided. In addition, academic engagement is affected by (a) students' perceived competence in their ability to accomplish some behavior and (b) role overload. This role overload is the degree to which individuals are overtaxed as a result of being under time pressure and having too many commitments and responsibilities (Jones et al., 2007). Effective engagement needs to address underlying psychological variables such as the need for (a) autonomy, (b) relatedness, and (c) competence (National Research Council 2003).

EXHIBIT 1
Academic Engagement



Source:

Adapted from: Young, M.R. (2010). The art and science of fostering engaged learning. *Academy of Educational Leadership Journal*, 14 (Special Issue), 1-18.

ENGAGEMENT AND LEARNING MODELS

This longitudinal study of engagement and learning draws upon (a) Karasek (1979, 1982, 1990) Job Demand Control Support (JDCS) model, (b) Demerouti et al. (2001), and Baaker and Demerouti (2007) Job Demand Resources (JD=R) model, and (c) Argyris (1970) Organizational Development Intervention model.

JDCS Model

The Job Demand Control Support (JDCS) Model postulates that psychological strain results from the joint effects of the demands of the work situation, the range of the decision-making freedom to face those demands, and the amount of support provided (Karasek 1979, Karasek et al. 1982, Karasek & Theorell 1990). Job demands are psychological stressors such as time pressure, heavy workload, ambiguity, and role conflict. Job control refers to an individual's potential control over work tasks and is composed of decision authority and skill discretion. The degree of autonomy, flexibility, and discretion in choosing the timing and methods for performing the tasks as well as the variety and creativity in skill usage affect the degree of job control. A key feature of this well-known model on occupational stress is the synergy between job demands and discretion. A combination of high demand and lack of control produces more psychological strain than the additive effect of the two variables (Fletcher & Jones 1993).

Simulation participants are exposed to a realistic job demand of decision-making in a dynamic, complex, and uncertain simulation environment with incomplete information under time pressure. Yet, they have control over the dss packages they use and the decision-making freedom to face those demands, compete effectively, and improve their team performance in the simulation competition. In addition, scaffolding support is provided as and when needed. Given the complex course structure, participants are given advance information and periodic reminders on WWA, team decisions, individual SMP Reports, and team presentation deadlines. Further, they are provided with an early and progressive orientation to the location, access, and use of online graphics and dss packages, dss-demo videos, and dss-related articles. When performance problems are identified, participants access online graphics- and dss-demo videos, dss-related articles, and dss packages in order to improve team performance.

JD-R Model

The Job Demands-Resources Model (JD-R) Model is flexible, incorporates more working conditions, and focuses on both negative and positive indicators of employee well-being (Demerouti et al. 2001, Baaker & Demerouti 2007). It can be used to improve well-being and performance. An extension and meta-analytic test of the JD-R model to employee engagement and burnout reveals that job demands and burnout are positively associated, while resources and burnout are negatively associated. In addition, resources and engagement are consistently positive, while relationships among job demands and engagement are dependent on the nature of demand. Job demands perceived by employees as hindrances are negatively associated with engagement, whereas job demands perceived by employees as challenges are positively related to engagement (Crawford et al. 2010). Accordingly, simulation participants who perceive the dynamic, complex, and uncertain nature of the simulation as a challenge that enhances their marketing strategy and decision-making skills, are consequently engaged in decision-making as they strive to improve team performance.

Argyris' Organizational Development Intervention Model

Lasting commitment to organizational change and personal developmental learning is facilitated by the three sequential steps of Argyris' model: generation and use of valid information, free, informed choice based on the information produced, and the consequent outcome of internal commitment to organizational change and personal developmental learning (Argyris, 1970; Hoover et al., 2016). Based on the Argyris model, valid information generation and free, informed choice lead to a lasting commitment to organizational change and personal developmental learning. Consequently, recent trends in complexity avoidance and narcissism may hinder the process of personal developmental learning (Hoover, 2011).

Accordingly, the challenge is to get potential learners aligned with the information relevant to their learning. Failure to do so will result in simulation participants making decisions based on incorrect, faulty, or incomplete information. Narcissists are particularly challenged to generate and use valid information. Consequently, they tend to resist organizational change and personal developmental learning (Hoover et al., 2016). The dss packages extract relevant information needed for decision-making from the simulation results and provide simulation participants with user-friendly and valid information. They (a) monitor and identify performance shortcomings such as weak profits, low market share, and incorrect brand positioning, (b) select and use relevant graphics and/or dss packages to analyze and identify the underlying reasons, and (c) take corrective

action to improve team performance. This process enhances motivation and engagement and leads to sustained personal developmental learning.

LEARNING ENVIRONMENT

Course engagement is fostered via course structure, simulation participation, extensive feedback, and satisfying the underlying psychological needs for autonomy, relatedness, and competence (National Research Council 2003). Further engagement can be augmented by providing participants with (a) the dss resources needed to meet the perceived challenge of decision-making in a dynamic, complex, and uncertain environment, and (b) the decision-making freedom and scaffolding support to meet the demands of heavy workloads, time pressure, ambiguity, and role conflict.

Course Structure

The undergraduate functional capstone writing-intensive Marketing Strategies course is a response to a call from the local business community to develop the analytical and communication skills of our graduates. The mission of the course is to learn and apply strategic market planning and marketing management skills to optimize overall company performance while maintaining a cash balance. Learning support is provided via scaffolding (Hogan and Pressley 1997) and collaborative learning (Bandura 1977).

The writing-intensive course designation stresses learning through writing and requires frequent writing with quality individual feedback. Phased debriefing reduces uncertainty, improves understanding of underlying performance determinants, builds confidence and engagement, and motivates teamwork to identify problems, take corrective action, and exercise marketing control (Palia 2019). The semester is divided into 5 phases of differing length. The initial 1-week 'Startup' phase is followed by a 2-week (initial debriefing) 4-trial-decision 'Prepare to Compete' phase, a 7-week (intermediate debriefing) 12-decision 'Compete' phase, a 5-week 'Report & Present' phase, and a 1-week (final debriefing) 'Wrap-Up' phase (see exhibit 2).

Individual Weekly Writing Assignments (WWAs), that involve external research and use of the graphics and/or dss packages, are scheduled during the Prepare to Compete (WWA #1), Compete (WWAs # 2, 3, 4, 5, and 6), and Report and Present (WWA #7) simulation phases. The 7 WWAs focus on 'Company/Brand Name and Logo Justification' (week 3), 'Market and Consumer Trends' (week 4), 'Report Introduction' (week 5), 'Mission Statement' (week 6), 'Positioning Strategy' (week 7), 'Brand Portfolio Assessment' (week 10), and 'Competitor Brand Portfolio Assessment' (week 11) respectively (see exhibit 2). All 7 individual WWAs are edited, graded (based on content, persuasiveness, external research, citations, and references), and returned individually to participants with helpful comments to prepare their team presentations and individual SMP Reports (see Exhibit 2).

At the end of the semester, each participant submits a quality 10-page (narrative) Strategic Market Plan (SMP) report (30% of course grade) based on team performance, marketing dss package usage, and external research. In addition, each company makes a one-hour-long team presentation (10% of course grade) that is divided into two equal parts.

The first 30-minute company report covers (a) the presentation agenda, (b) company and brand name justification, and logo explanation, (c) the mission statement, (d) the organizational structure selected with individual responsibilities, (e) performance analysis, (f) strategic, tactical, and forecasting errors made and lessons learned, and (g) sales forecast model using multiple regression analysis with forecast made and forecast error experienced.

The second 30-minute company marketing plan covers (a) strategic analysis based on the Aaker framework (Aaker, 2014; Aaker & Moorman, 2018), (b) positioning analysis and strategy using VALS psycho-geo-demographic segmentation data and product positioning maps (PPM) based on simulation performance data, (c) strategic market plan via product portfolio analysis (PPA) using the BCG strategic grids based on simulation performance data, (d) recommended evaluation and control mechanisms, and (e) conclusion with research references. In addition, each team submits a team presentation handout (10% of course grade) with dss packages and external references used.

Simulation participants are motivated to download, use, and include appropriate graphics and dss packages with their individual WWAs to improve their (a) individual WWA scores (10% of course grade), (b) team performance (10%), (c) individual SMP Report (30%), and (d) team presentation (20%). This dss-induced motivation and engagement is reflected in the tracking data that reveal increased dss downloads and usage preceding the deadlines for WWAs, team decisions, team presentations, and individual SMP Reports in Spring 2022.

EXHIBIT 2 Course Structure (Phased Simulation Debriefing)

MKT 391 - Marketing Strategies Spring Semester, 2022														
Week	Session	Date	Day	Topic	Decisions				Weekly Writing Assignments				Read	
					Dec	Date	Day	Time	WWAs	Date	Day	Time		
1	1	11-Jan	T	Course Introduction / Website Demo										T1 + H
	2	13-Jan	Th	Overview of COMPETE / CODES Demo										C 1-21
2	3	18-Jan	T	Decisions / Markets / Products	TD1	18-Jan	T	8:00 pm						C 22-51
	4	20-Jan	Th	Financial Statements	TD2	21-Jan	F	8:00 pm						C 52-57
3	5	25-Jan	T	Strategic Market Management	TD3	25-Jan	T	8:00 pm	WWA #1	24-Jan	M	11:59 pm		T2 + H
	6	27-Jan	Th	Printout Analysis [Company & Product Names] Quiz (100)	TD4	28-Jan	F	8:00 pm						C 58-77
4	7	1-Feb	T	Hands On (HO) - Mktg DSS Demo	D1	1-Feb	T	8:00 pm	WWA #2	31-Jan	M	11:59 pm		Handout
	8	3-Feb	Th	HO - Mktg DSS Demo	D2	4-Feb	F	8:00 pm						Handout
5	9	8-Feb	T	Mkt Segmentation Analysis & Positioning	D3	8-Feb	T	8:00 pm	WWA #3	7-Feb	M	11:59 pm		T3 + H
	10	10-Feb	Th	VALS & VALS 2	D4	11-Feb	F	8:00 pm						T4 + H
6	11	15-Feb	T	Strategic Market Planning	D5	15-Feb	T	8:00 pm	WWA #4	14-Feb	M	11:59 pm		T5 + H
	12	17-Feb	Th	PPA Analysis - GSM	D6	18-Feb	F	8:00 pm						T6 + H
7	13	22-Feb	T	PPA Analysis - GGM	D7	22-Feb	T	8:00 pm	WWA #5	21-Feb	M	11:59 pm		T7 + H
	14	24-Feb	Th	PPA - Generic Strategies	D8	25-Feb	F	8:00 pm						T8 + H
8	15	1-Mar	T	Sales Forecasting	D9	1-Mar	T	8:00 pm						T9 + H
	16	3-Mar	Th	Regression	D10	4-Mar	F	8:00 pm						T10 + H
9	17	8-Mar	T	HO - Sales Forecast Model Building	D11	8-Mar	T	8:00 pm						Handout
	18	10-Mar	Th	PPA - Normative Position of Brands										T11 + H
		15-Mar	T	HOLIDAY - SPRING RECESS										
		17-Mar	Th	HOLIDAY - SPRING RECESS										
10	19	22-Mar	T	Strategic Market Planning Process	D12	22-Mar	T	8:00 pm	WWA #6	21-Mar	M	11:59 pm		T12 + H
	20	24-Mar	Th	HO - SMP - Internal Balance										
11	21	29-Mar	T	HO - SMP - Trends					WWA #7	28-Mar	M	11:59 pm		
	22	31-Mar	Th	HO - SMP - Competitors										
12	23	5-Apr	T	HO - SMP - Other Factors										
	24	7-Apr	Th	HO - SMP - Target Portfolio										
13	25	12-Apr	T	HO - SMP - Financial Balance										
	26	14-Apr	Th	GE Matrix & PIMS										
14	27	19-Apr	T	Team Presentation - C1 / E1 (100)										
	28	21-Apr	Th	Team Presentation - C2 / E2										
15	29	26-Apr	T	Team Presentation - C3 / E3										
	30	28-Apr	Th	Team Presentation - C4 / E4										
16	31	3-May	T	Team Performance (100) & Wrap Up										
		5-May	Th	STUDY PERIOD										
	Sect.1	10-May	T	SMP Report (300) [9:45 - 11:45]										
	Sect.2	12-May	Th	SMP Report (300) [12:00 - 2:00]										
				LEGEND:	T = Strategic Market Management Text				Phased Debriefing:					
					C = COMPETE Manual available online via CODES				Prepare to Compete Phase - Initial Briefing					
					H = Handout available online via CODES				Compete Phase - Intermediate Debriefing					
					WWA = Weekly Writing Assignment (Submit Microsoft Word document file via e-mail)				Report & Present Phase					
									Wrap-up - Final Debriefing					

COMPETE Marketing Simulation

COMPETE (Faria, 2006) is a marketing simulation designed to provide students with marketing strategy development and decision-making experience. Competing student teams are placed in a complex, dynamic, and uncertain environment. Participants experience the excitement and uncertainty of competitive events and are motivated to be active seekers of knowledge. They learn the need for, and usefulness of, mastering an underlying set of decision-making principles. The complex, dynamic, interactive, batch processed COMPETE simulation is flexible and provides participants with the opportunity to experiment with different marketing strategies. The administrator can (a) select an additive, multiplicative, or multiple exponential model, (b) vary the elasticity of each of the 74 decision variables, (c) introduce stimulators (cost increases, strikes, new competition) during different decision periods, and (d) notify participants in advance of changes introduced via a message center.

Competing student teams plan, implement, and control a marketing program for three high-tech products in three regions Region 1 (R1), Region 2 (R2), and Region 3 (R3) within the United States. These three products are a Total Spectrum Television (TST), a Computerized DVD/Video Editor (CVE), and a Safe Shot Laser (SSL). The features and benefits of each product and the characteristics of consumers in each region are described in the student manual. Based on a marketing opportunity analysis, a mission statement is generated, specific and measurable company goals are set, and marketing strategies are formulated to achieve these goals. Constant monitoring and analysis of their own and competitors' performance helps the teams better understand their markets and improve their decisions.

Each decision period (quarter), the competing teams make a total of 74 marketing decisions concerning marketing their three brands in the three regional markets. These 74 decisions include nine pricing decisions, nine shipment decisions, three sales force size decisions, nine sales force time allocation decisions, one sales force salary decision, one sales force commission decision, twenty-seven advertising media decisions, nine advertising content decisions, three quality-improvement R&D

decisions, and three cost-reduction R&D decisions. Successful planning, implementation, and control of their respective marketing programs require that each company constantly monitor trends in its own and competitive decision variables and resulting performance. The teams use the COMPETE Portal, a revised COMPETE Online Decision Entry System (CODES) (Palia, Mak, & Roussos, 2000, 2001) to enter their decisions, retrieve their results, and download and use a wide array of marketing dss packages.

COMPETE DSS and Online Graphics Packages

DSS packages enable simulation participants to make better-informed decisions such as target profit pricing, sales forecasting, market segmentation and positioning, market mix analysis, competitor analysis, forecast error impact analysis, ratios analysis, cash flow analysis, and strategic market planning, as they are progressively introduced during the simulation competition. Simulation participants use web-based strategic market planning (Palia, 1991, 1995; De Ryck, & Mak, 2002), and positioning (Palia, De Ryck, & Mak, 2003; Palia & De Ryck, 2013) graphic packages. In addition, they use a wide array of target profit pricing (Palia, 2008), competitor analysis (Palia & De Ryck, 2015), forecast error impact (Palia, 2011), marketing mix analysis, multiple regression analysis (Palia, 2004), ratios analysis, strategic business unit (SBU) analysis (Palia, 2009), portfolio normative consistency analysis (Palia, 2012), target portfolio analysis (Palia, 2017), cash flow analysis (Palia, 2010), profitability analysis (Palia & De Ryck, 2014), cumulative team performance (Palia 2005), cost of production analysis (Palia & De Ryck, 2016), proforma analysis (Palia, 2007), and marketing efficiency analysis (Palia, 2018) workbooks that auto-extract and present relevant data from the simulation results and facilitate subsequent analysis and decision-making.

For instance, a screenshot of the Competitor Analysis dss package used by Peak Horizons (team C2) in decision period 12 indicates the strengths (green) and weaknesses (red) of each element of the marketing mix relative to competitors. The data are extracted via external linking from the team performance results file. Based on the extracted data, Peak Horizons (C2) has the lowest price, largest broadcast-, print-, and total- advertising budget, as well as sales force salary, but relatively weak quality, sales promotion budget, sales force size, and commission (see Exhibit 3). This dss package is used by the competing participant teams to:

- understand the reasons for current performance,
- make better-informed future team decisions,
- operationalize strategic SWOT analysis, and
- implement competitor analysis in strategic market planning.

Extensive feedback is provided on team performance and weekly writing assignments. First, during each decision period, the competing teams receive cumulative team performance rankings on 18 performance measures for their own company. Next, cumulative competitor rankings on profit, market share, quality, cost of production, and efficiency are released at the end of the four trial decision periods before the start of simulation competition, in order to facilitate preliminary cause-effect analyses and initial simulation debriefing, as well as to establish credibility in the ranking system. The cumulative team performance rankings are released at the end of each year (4 quarterly decisions) of the simulation competition for intermediate debriefing purposes (Palia 2005). Then, at the end of the 4-trial-decision 'Prepare to Compete' phase, and subsequently, at the end of competition during the 'Compete' phase, the competing teams can access the cumulative End Game Performance Package to analyze simulation results, and prepare individual strategic market plan reports, and team presentations (Palia 2019).

The course design fosters effective engagement via a focus on the underlying psychological needs for autonomy, relatedness, and competence (National Research Council 2003). Autonomy is promoted by providing competing team participants with 24/7 online access and freedom of choice of dss packages used to analyze and improve team performance. Relatedness is nurtured by providing team participants the opportunity to respond jointly to thinklets in class, and to seek clarifications and guidance during in-class or remote scaffolding sessions with the instructor. Perceived competence is enhanced as participants identify setbacks in team performance, use relevant dss packages to analyze and understand the underlying reasons, take corrective action, and exercise marketing control.

Course engagement is advanced and accelerated via early mediation of decision support. Based on insights derived from monitoring course engagement and continuing participant suggestions, the dss packages are introduced during the initial 'Startup' week and the 2-week initial debriefing 'Prepare to Compete' simulation phase of the Spring 2022 semester. The following engagement metrics monitored daily during both the Spring 2021 (n=34) and Spring 2022 (n=37) semesters indicate advanced, accelerated, and increased downloads and usage of both graphics and dss packages during the Spring 2022 semester.

EXHIBIT 3
Competitor Analysis dss Package

Competitor Analysis															
Peak Horizons Company 2 Period 12															
Co.	EPS	SBU	PPA		PPM	Price	Quality	Advertising				Salesforce			
			Typology	Strategy	Position			BC \$'000s	PRT \$'000s	SP \$'000s	Total \$'000s	Copy	#	Salary	Comm.
		TST - 1	Select	Select	Select	\$4,350	101	\$ 100,000	\$ 40,000	\$ 20,000	\$ 160,000	1	37		
		TST - 2	Select	Select	Select	\$4,350	101	\$ 150,000	\$ 60,000	\$ 30,000	\$ 240,000	1	40		
		TST - 3	Select	Select	Select	\$4,350	101	\$ 110,000	\$ 70,000	\$ 40,000	\$ 220,000	1	36		
		CVE - 1	Select	Select	Select	\$ 445	101	\$ 130,000	\$ 90,000	\$ 70,000	\$ 290,000	1	37		
1	\$ 2.42	CVE - 2	Select	Select	Select	\$ 435	101	\$ 120,000	\$ 90,000	\$ 70,000	\$ 280,000	1	40	\$4,200	2.4%
		CVE - 3	Select	Select	Select	\$ 440	101	\$ 120,000	\$ 120,000	\$ 50,000	\$ 290,000	1	36		
		SSL - 1	Select	Select	Select	\$ 49	100	\$ 120,000	\$ 50,000	\$ 50,000	\$ 220,000	1	37		
		SSL - 2	Select	Select	Select	\$ 48	100	\$ 140,000	\$ 80,000	\$ 70,000	\$ 290,000	1	40		
		SSL - 3	Select	Select	Select	\$ 48	100	\$ 80,000	\$ 50,000	\$ 70,000	\$ 200,000	1	36		
		TST - 1	Select	Select	Select	\$4,299	101	\$ 160,000	\$ 170,000	\$ 30,000	\$ 360,000	5	36		
		TST - 2	Select	Select	Select	\$ 4,149	101	\$ 150,000	\$ 180,000	\$ 30,000	\$ 360,000	1	36		
		TST - 3	Select	Select	Select	\$4,299	101	\$ 170,000	\$ 170,000	\$ 30,000	\$ 370,000	2	33		
		CVE - 1	Select	Select	Select	\$ 419	100	\$ 160,000	\$ 170,000	\$ 30,000	\$ 360,000	5	36		
2	\$ (0.46)	CVE - 2	Select	Select	Select	\$ 429	100	\$ 150,000	\$ 180,000	\$ 30,000	\$ 360,000	1	36	\$4,600	2.2%
		CVE - 3	Select	Select	Select	\$ 429	100	\$ 170,000	\$ 170,000	\$ 30,000	\$ 370,000	2	33		
		SSL - 1	Select	Select	Select	\$ 44	100	\$ 160,000	\$ 160,000	\$ 30,000	\$ 350,000	5	36		
		SSL - 2	Select	Select	Select	\$ 44	100	\$ 140,000	\$ 170,000	\$ 30,000	\$ 340,000	1	36		
		SSL - 3	Select	Select	Select	\$ 44	100	\$ 160,000	\$ 160,000	\$ 30,000	\$ 350,000	2	33		
		TST - 1	Select	Select	Select	\$4,600	107	\$ 160,000	\$ 170,000	\$ 30,000	\$ 360,000	5	37		
		TST - 2	Select	Select	Select	\$4,600	107	\$ 170,000	\$ 90,000	\$ 50,000	\$ 310,000	5	37		
		TST - 3	Select	Select	Select	\$4,450	107	\$ 180,000	\$ 170,000	\$ 30,000	\$ 380,000	2	36		
		CVE - 1	Select	Select	Select	\$ 460	103	\$ 160,000	\$ 130,000	\$ 50,000	\$ 340,000	2	37		
3	\$ 1.97	CVE - 2	Select	Select	Select	\$ 440	103	\$ 130,000	\$ 130,000	\$ 30,000	\$ 290,000	2	37	\$4,400	2.3%
		CVE - 3	Select	Select	Select	\$ 450	103	\$ 140,000	\$ 50,000	\$ 20,000	\$ 210,000	1	36		
		SSL - 1	Select	Select	Select	\$ 45	110	\$ 140,000	\$ 70,000	\$ 70,000	\$ 280,000	2	37		
		SSL - 2	Select	Select	Select	\$ 45	110	\$ 160,000	\$ 100,000	\$ 90,000	\$ 350,000	2	37		
		SSL - 3	Select	Select	Select	\$ 45	110	\$ 100,000	\$ 70,000	\$ 80,000	\$ 250,000	2	36		
		TST - 1	Select	Select	Select	\$4,500	105	\$ 150,000	\$ 60,000	\$ 20,000	\$ 230,000	3	39		
		TST - 2	Select	Select	Select	\$4,386	105	\$ 150,000	\$ 70,000	\$ 40,000	\$ 260,000	1	37		
		TST - 3	Select	Select	Select	\$4,400	105	\$ 140,000	\$ 60,000	\$ 10,000	\$ 210,000	3	36		
		CVE - 1	Select	Select	Select	\$ 450	103	\$ 180,000	\$ 150,000	\$ 60,000	\$ 390,000	5	39		
4	\$ 2.14	CVE - 2	Select	Select	Select	\$ 450	103	\$ 150,000	\$ 120,000	\$ 60,000	\$ 330,000	1	37	\$4,100	2.3%
		CVE - 3	Select	Select	Select	\$ 455	103	\$ 140,000	\$ 120,000	\$ 50,000	\$ 310,000	3	36		
		SSL - 1	Select	Select	Select	\$ 54	110	\$ 150,000	\$ 80,000	\$ 40,000	\$ 270,000	2	39		
		SSL - 2	Select	Select	Select	\$ 49	110	\$ 180,000	\$ 90,000	\$ 60,000	\$ 330,000	1	37		
		SSL - 3	Select	Select	Select	\$ 49	110	\$ 130,000	\$ 50,000	\$ 20,000	\$ 200,000	1	36		

DSS-INDUCED ENGAGEMENT METRICS BY SIMULATION PHASE

DSS engagement metrics monitored daily during Spring 2021 and 2022 include (a) online simulation portal page view trends, (b) online product positioning map (PPM) and product portfolio analysis (PPA) graphics package generation trends, and (c) Excel-based dss package download and usage trends.

Online Portal Page View Trends

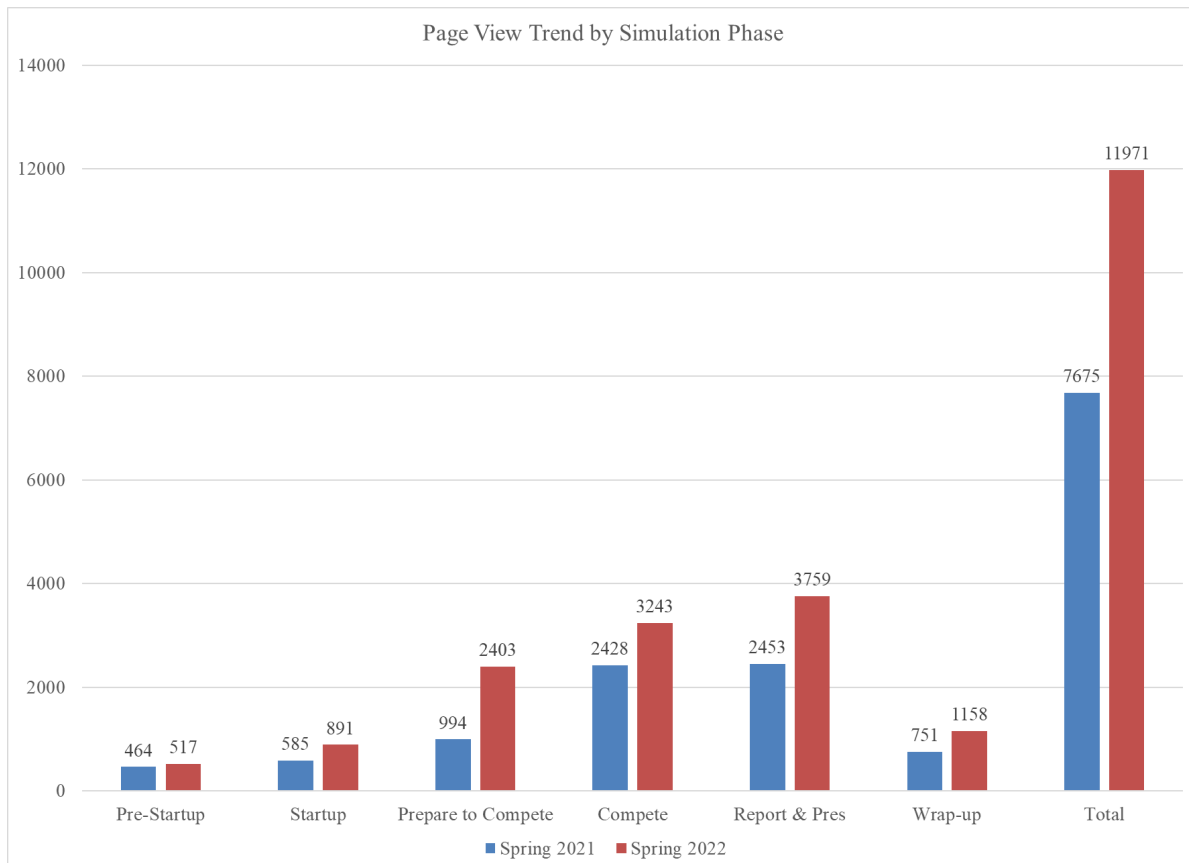
Early introduction of dss packages during Spring 2022 resulted in accelerated online course engagement inside and outside class. A summary of Statcounter tracking data on inside-class (yellow), outside-class, and total page views are shown juxtaposed with trial decisions TD1 to TD4 and decision D1 (turquoise), WWA 1 & 2 deadlines (pink), and topic coverage (yellow), during the 'Prepare to Compete' phase in January 2022. During the 1-week 'Setup' phase participants registered 891 page views. Course engagement accelerated to 2485 page views during the subsequent 'Prepare to Compete' TD phase, before the start of competition (see Exhibit 4).

The online COMPETE portal and course website total webpage views increased by 55.97% from 7,675 in Spring 2021 to 11,971 in Spring 2022. Page views increased in every simulation phase – by 52.31% from 585 (Spring 2021) to 891 (Spring 2022) in the 'Startup' phase, by 141.75% from 994 to 2485 in the 'Prepare to Compete' phase, by 33.57% from 2428 to 3243

EXHIBIT 4 Course Engagement – Spring 2022

Statcounter Website Tracking (Individual User)							MKT 391 Course S
Day	Date	In	Out	ageView	Dec.	wwas	Topic
Wednesday	1/5/2022		5	5			LEGEND:
Thursday	1/6/2022	Zoom	110	110			Phase / Event
Friday	1/7/2022		25	25			Topic Coverage
Saturday	1/8/2022		32	32			WWA Deadlines & Feedback
Sunday	1/9/2022		36	36			Decisions
Monday	1/10/2022		39	39			
Tuesday	1/11/2022	304	114	418			Team Formation/COMPETE Portal Team Reg. / Login
Wednesday	1/12/2022		117	117			
Thursday	1/13/2022	117	42	159			Course Syllabus/Website Inro/Initial Forecast
Friday	1/14/2022		13	13			
Saturday	1/15/2022		25	25			
Sunday	1/16/2022		83	83			
Monday	1/17/2022		76	76			
Tuesday	1/18/2022	162	253	415	TD1		COMPETE Intro
Wednesday	1/19/2022		44	44			
Thursday	1/20/2022	164	181	345			TD1 Results Financial Analysis
Friday	1/21/2022		161	161	TD2		
Saturday	1/22/2022		60	60			
Sunday	1/23/2022		191	191			Team Meetings
Monday	1/24/2022		380	380		wwa1	Company/Brand Name/Logo Justification
Tuesday	1/25/2022	74	94	168	TD3		Strategic Market Management
Wednesday	1/26/2022		71	71			Team Meetings
Thursday	1/27/2022	35	73	108			Quiz/Printout Analysis
Friday	1/28/2022		33	33	TD4		
Saturday	1/29/2022		52	52			
Sunday	1/30/2022		114	114		wwa1f	COMPETE Reset
Monday	1/31/2022		261	261		wwa2	Market & Consumer Trends
Tuesday	2/1/2022	209	79	288	D1		Hands-On Session 1 - Profitability / Competitor / Forec

EXHIBIT 5 Online Page View Trends by Simulation Phase (Spring 2021 and Spring 2022)

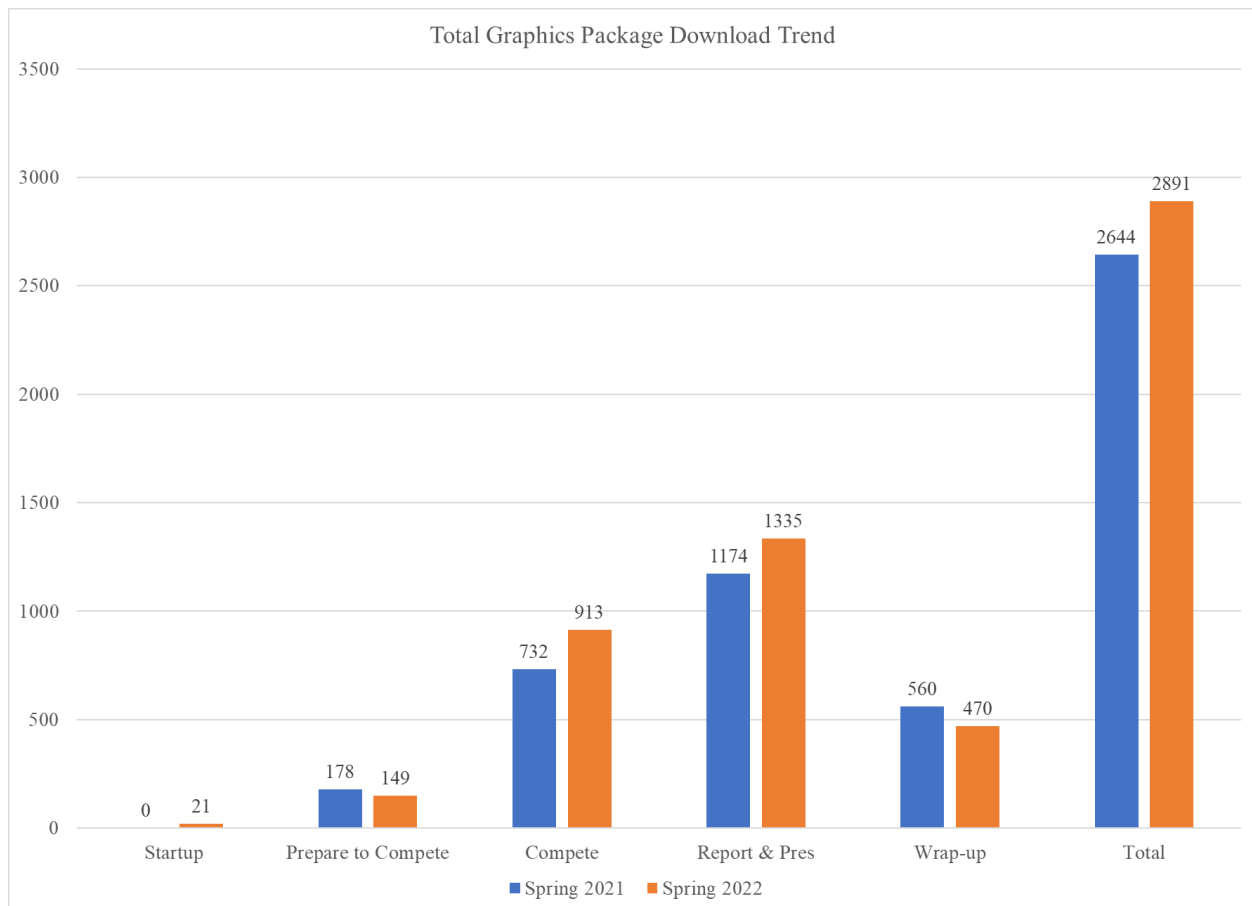


in the 'Compete' phase, by 53.24% from 2453 to 3759 in the 'Report & Present' phase, and by 54.19% from 751 to 1158 in the 'Wrap-up' phase (see Exhibit 5).

Online Graphics Trend Metrics

Online product positioning map (PPM) and product portfolio analysis (PPA) graphics tied to the simulation results are generated and used by competing participant teams in positioning and strategic market planning respectively. Total online PPM and PPA graphics generated online increased by 9.34% from 2,644 in Spring 2021 to 2,891 in Spring 2022 (see Exhibit 6).

EXHIBIT 6
Online Graphics Package Usage Trends by Simulation Phase (Spring 2021 and Spring 2022)



PPMs are generated by participants to (a) develop a positioning strategy for each of their SBUs, (b) monitor their SBU positions relative to competitor SBUs, and (c) complete and submit their individual WWA5 on Positioning Analysis. PPM usage metrics tied to relevant topic coverage (yellow), decisions D3 to D7 (turquoise) and to WWA5 on Positioning Analysis (pink) during Spring 2022 are illustrated in Exhibit 7.

Product positioning maps (PPMs) generated online increased by 6.70% from 1507 in Spring 2021 to 1608 in Spring 2022. PPMs generated decreased by 8.59% in the 'Prepare to Compete' phase, increased by 7.93% in the 'Compete' phase, increased by 30.75% in the 'Report & Present' phase, and decreased by 29.47% in the 'Wrap-up' phase (see Exhibit 8).

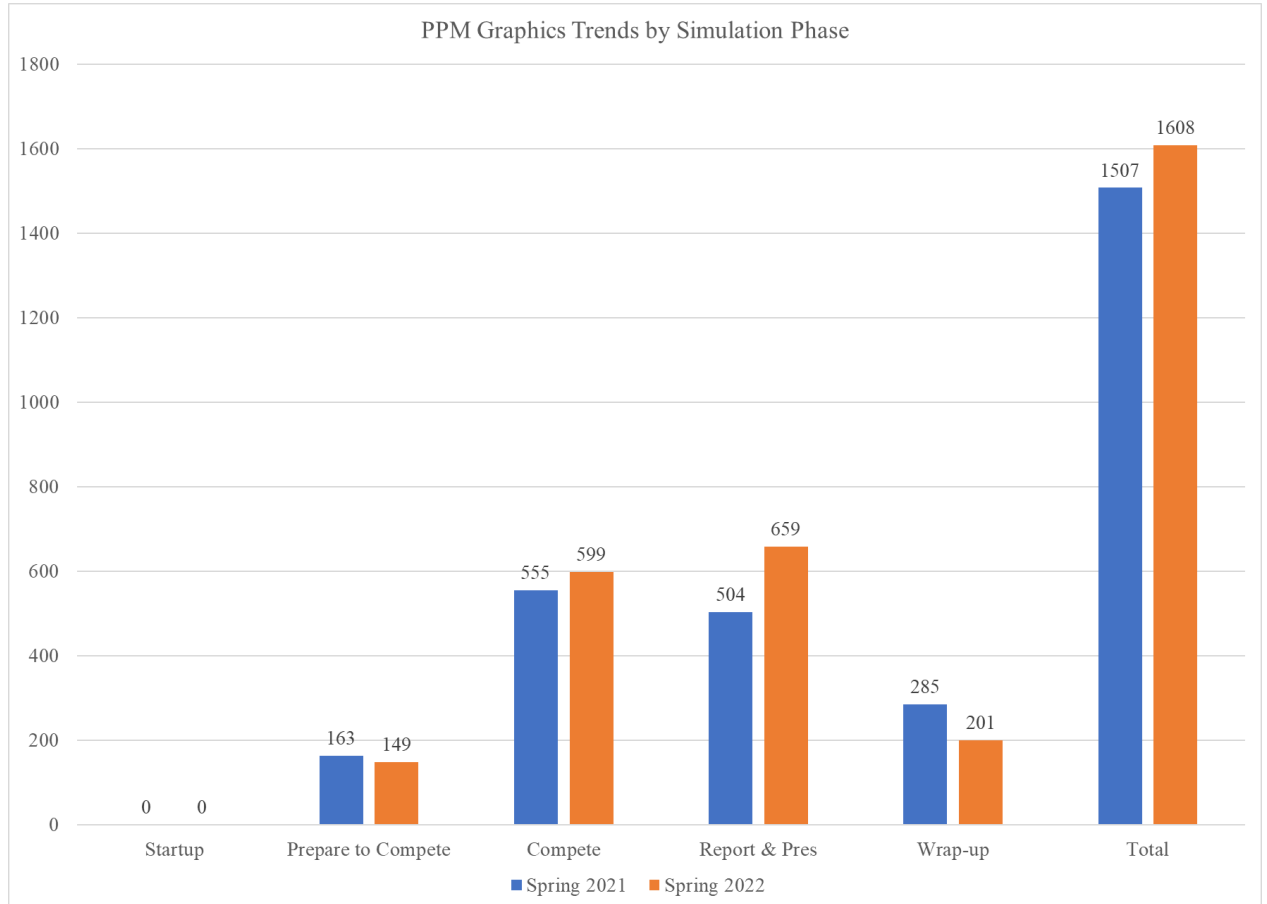
Product Portfolio Analysis (PPA) graphics are generated after 8 quarterly decision periods towards the end of the 7-week 'Compete' phase, as the market growth rate (from year 1 to 2) of each of the 9 SBUs is calculated and plotted on the server. PPA graphics generated in earlier 'Startup' and 'Prepare to Compete' phases based on prior sample performance data are for introduction and demonstration purposes.

PPAs are generated by participants to (a) monitor their own and competitor SBU portfolios, and (c) prepare a strategic market plan for their SBU portfolio. PPA usage metrics tied to relevant topic coverage (yellow), the final decisions D12 (turquoise) and to WWA6 on Brand Portfolio Assessment and WWA7 on Competitor Brand Portfolio Assessment respectively (pink) during

EXHIBIT 7 Product Positioning Map Graphics Usage Tied to Course Assignments (Spring 2022)

Website Tracking (Individual)		Online Graphics Package Downloads						MKT 391 Course S		
		Inside Class			Outside Class					
Day	Date	PPMC	PPME	PPA	PPMC	PPME	PPA	Dec.	wwas	Topic
Friday	2/4/2022				4			D2		
Saturday	2/5/2022				1					
Sunday	2/6/2022								wwa2f	
Monday	2/7/2022				1	8			wwa3	SMP Report Introduction
Tuesday	2/8/2022				13	3		D3-S1		Market Segmentation Analysis
Wednesday	2/9/2022									Positioning / VALS data
Thursday	2/10/2022	3	3		6					
Friday	2/11/2022				6	4		D4		
Saturday	2/12/2022									
Sunday	2/13/2022								wwa3f	
Monday	2/14/2022						3		wwa4	Mission Statement Deadline
Tuesday	2/15/2022				3	13		D5		Strategic Market Planning SMP 1
Wednesday	2/16/2022				8					
Thursday	2/17/2022				24	9				SMP 2
Friday	2/18/2022				12	13		D6-S2		
Saturday	2/19/2022				22	17				
Sunday	2/20/2022								wwa4f	
Monday	2/21/2022				121	110	1		wwa5	Positioning Analysis
Tuesday	2/22/2022				4	12		D7		SMP 3
Wednesday	2/23/2022					2				

EXHIBIT 8 Product Positioning Map Graphics Usage Trends by Simulation Phase (Spring 2021 and Spring 2022)



Spring 2022 are illustrated in Exhibit 9. The PPA graphics package is used towards the end of the ‘Compete’ phase and intensively used during the ‘Report & Present phase to prepare their team presentations and individual SMP Reports at the end of the semester (see exhibit 9).

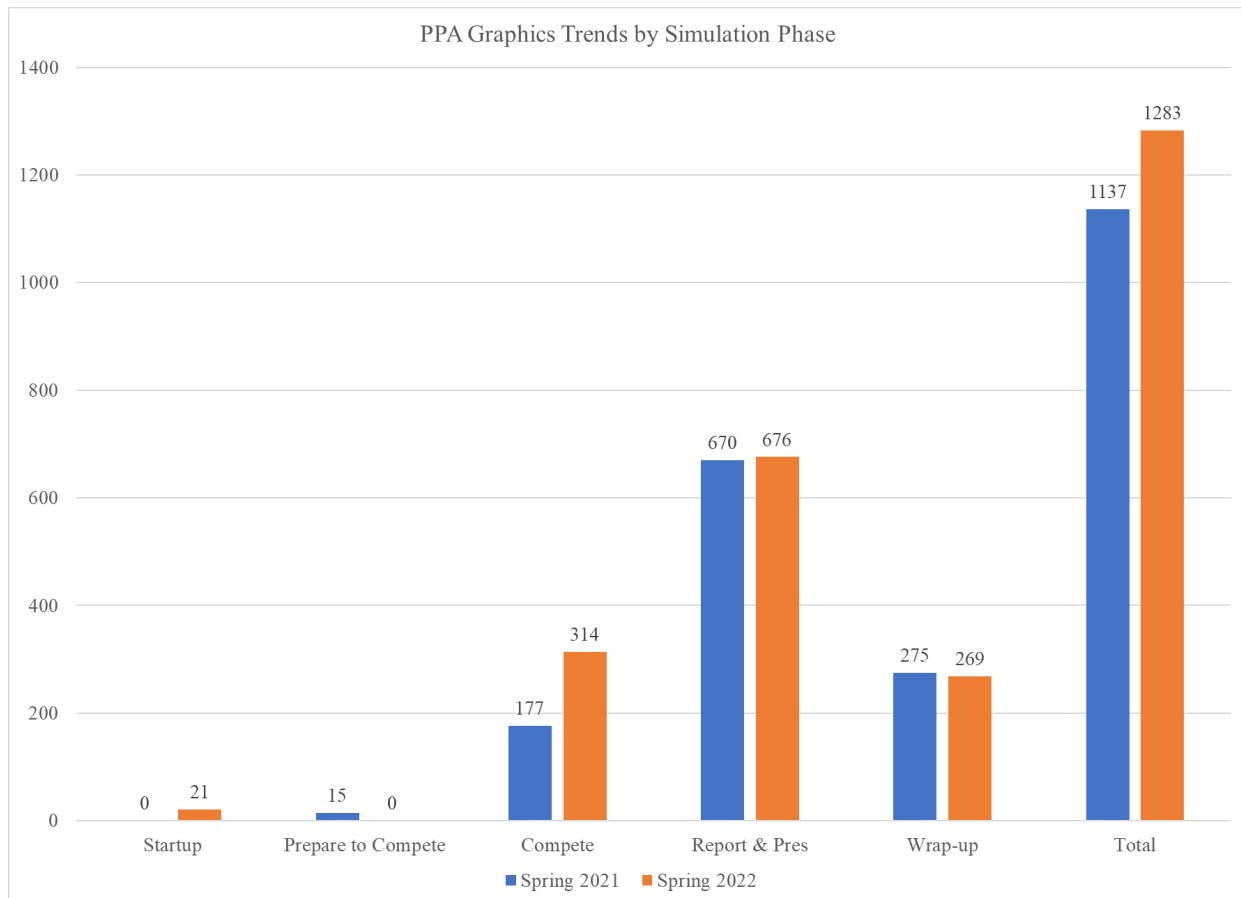
EXHIBIT 9

Product Portfolio Analysis Graphics Usage Tied to Course Assignments (Spring 2022)

Website Tracking (Individual)		Online Graphics Package Downloads						MKT 391 Course S		
		Inside Class			Outside Class					
Day	Date	PPMC	PPME	PPA	PPMC	PPME	PPA	Dec.	wwas	Topic
Friday	3/11/2022									
Saturday	3/12/2022									
Sunday	3/13/2022									
Monday	3/14/2022									SPRING RECESS
Tuesday	3/15/2022									SPRING RECESS
Wednesday	3/16/2022						1			SPRING RECESS
Thursday	3/17/2022									SPRING RECESS
Friday	3/18/2022						1	21		SPRING RECESS
Saturday	3/19/2022				5			5		
Sunday	3/20/2022							26		
Monday	3/21/2022		2		2			126	wwa6	Brand Portfolio Assessment
Tuesday	3/22/2022				21	6	24	D12		Strategic Marketing Process
Wednesday	3/23/2022							8		
Thursday	3/24/2022			21				15		Hands-On Session 4 - SMP - Check Internal Balance
Friday	3/25/2022							11		
Saturday	3/26/2022							8		
Sunday	3/27/2022				1			27	wwa6f	
Monday	3/28/2022					7	179		wwa7	Competitor Brand Portfolio Assessment
Tuesday	3/29/2022			17		1	17			Hands-On Session 5 - SMP - Look for Trends
Wednesday	3/30/2022				1	2	15			
Thursday	3/31/2022			3		1	4			Hands-On Session 6 - SMP - Competitors

EXHIBIT 10

Product Portfolio Analysis Graphics Usage Trends by Simulation Phase (Spring 2021 and Spring 2022)

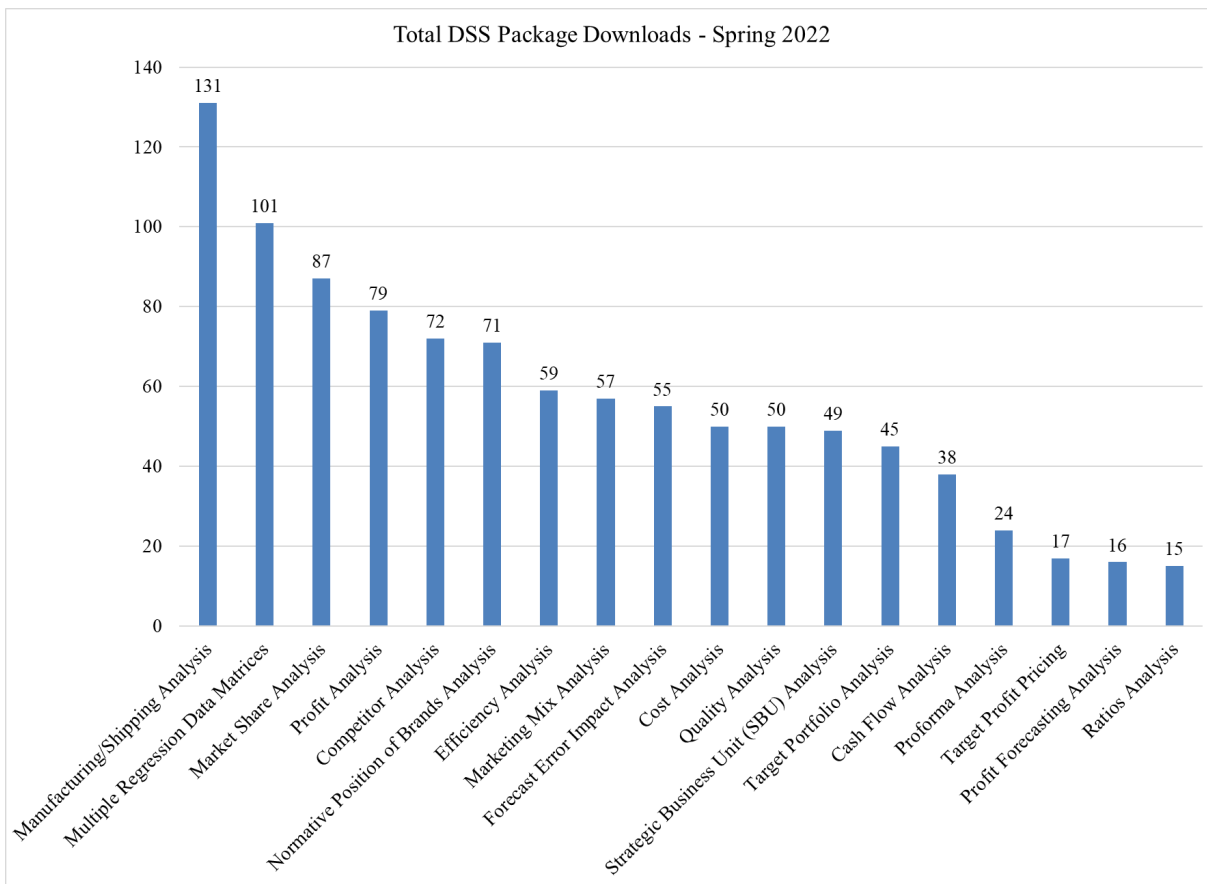


Total PPA graphics generated online increased by 12.84% from 1137 in Spring 2021 to 1283 in Spring 2022. They increased by 77.40% in the ‘Compete’ phase, increased by 0.90% in the ‘Report & Present’ phase, and decreased by 2.18% in the ‘Wrap-up’ phase (see Exhibit 10).

DSS Usage Trend Metrics

Based on daily monitoring of dss package usage during Spring 2022 (see Exhibit 11), the first tier of 6 most frequently used dss packages in Spring 2022 are manufacturing/shipping analysis (131 downloads), multiple regression data matrices (101), market share analysis (87), profit analysis (79), competitor analysis (72), and normative position of brands analysis (71). The second tier of 8 frequently used dss packages includes efficiency analysis (59), marketing mix analysis (57), forecast error impact analysis (55), cost analysis (50), quality analysis (50), strategic business unit (SBU) analysis (49), target portfolio analysis (45), and cash flow analysis (38). The third tier of the 4 least frequently used dss packages include proforma analysis (24), target profit pricing (17), profit forecasting analysis (16) and ratios analysis (15).

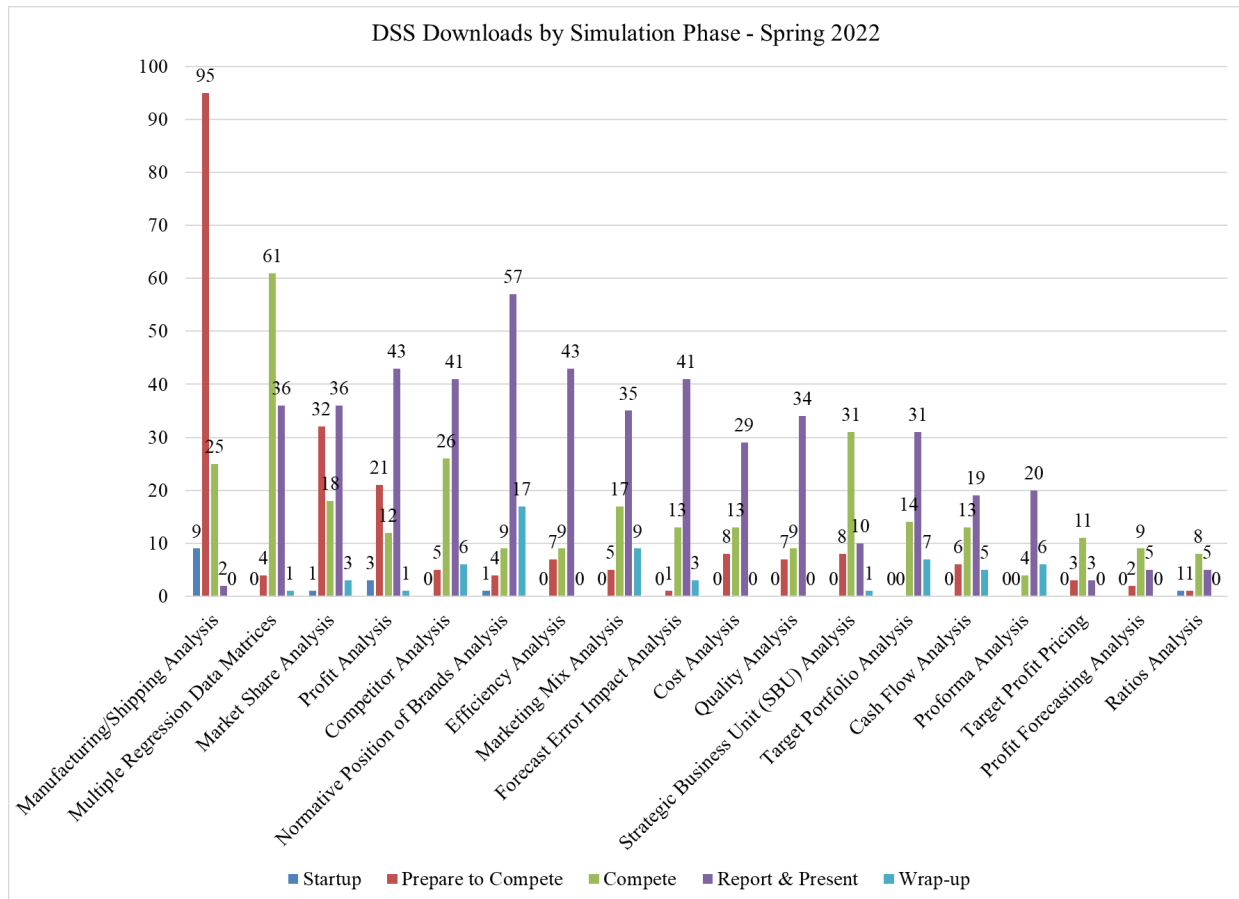
EXHIBIT 11
DSS Usage – Spring 2022



Trend analysis of dss usage by simulation phase reveals the correlation between dss usage and timing of course assignments such as (a) decision deadlines, (b) weekly writing assignment content and deadlines, (c) team presentation deadlines, and (d) individual SMP report deadlines. DSS package usage by simulation phase in Spring 2022 is illustrated in Exhibit 12. The most frequently used dss packages by simulation phase include:

- manufacturing/shipping analysis (95 downloads) during the ‘Prepare to Compete’ phase,
 - multiple regression data matrices (61) during the ‘Compete’ phase,
 - normative position of bands analysis (57) during the ‘Report & Present’ phase,
 - profit analysis (43) and efficiency analysis (43) during the ‘Report & Present’ phase,
 - competitor analysis (41) and forecast error impact analysis (41) during the ‘Report & Present’ phase.
- (see Exhibit 12).

EXHIBIT 12 DSS Usage by Simulation Phase – Spring 2022



First, during the 1-week ‘Startup’ phase, students are (a) introduced to the course website, COMPETE portal, and course schedule, and (b) provided the demand forecast (generated by the COMPETE simulation during the industry setup process) for each of their 9 SBUs in the first of four sequential trial decisions (see exhibit 2). The purpose of the four sequential trial decisions during the second and third weeks is to (a) get simulation participants familiar with online decision entry and results retrieval, and (b) give them the opportunity to experiment with different marketing strategies. They are introduced to the manufacturing/shipping analysis dss package that helps them decide on shipments for each of the 9 SBUs based on industry demand forecast, existing inventory, anticipated market share, and safety stock. Consequently, the primary dss package used during the ‘Startup’ phase is the manufacturing/shipping analysis (9 downloads) followed by profit analysis (3). The early introduction of dss packages in Spring 2022 resulted in increased usage of the manufacturing/shipping analysis from 1 in Spring 2021 to 9 in Spring 2022 (see Exhibit 13).

Next, during the second 2-week ‘Prepare to Compete’ phase (weeks 3 and 4), participant teams enter four sequential quarterly trial decisions (TD1 to TD4). Topics covered include COMPETE simulation orientation, financial statement analysis (based on TD1 performance results), strategic market management, and printout (performance and research report) analysis (based on TD3 performance results). A COMPETE quiz (10% of course grade) is administered. Individual participants submit the first WWA1 on Company/Brand Name & Logo justification, and each team submits a Company /Product Names and Goals form.

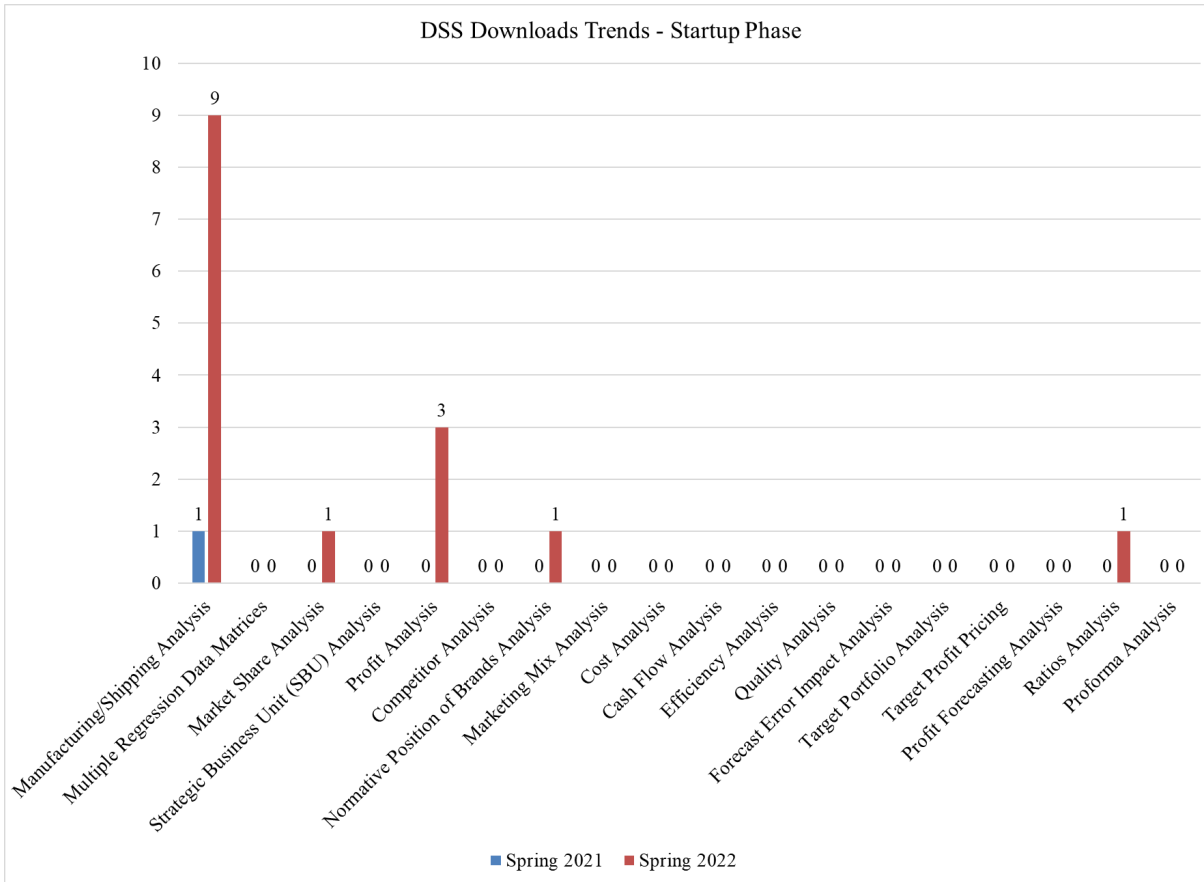
At the end of the ‘Prepare to Compete’ phase, participant teams are provided intermediate simulation debriefing via the cumulative ‘End-Game Performance Package’ to analyze simulation results. The COMPETE simulation is reset with the company and product names for the 12 sequential quarterly decisions during the subsequent ‘Compete’ phase (see exhibit 2).

Early introduction of dss packages in Spring 2022 resulted in increased usage of:

- manufacturing/shipping analysis from 7 in Spring 2021 to 95 in Spring 2022,
- market share analysis from 1 to 32, and
- profit analysis from 3 to 21

during the 2-week ‘Prepare to Compete’ phase (see exhibit 14).

EXHIBIT 13
DSS Usage Trends – Startup Phase



In addition, simulation participants increased exploration of:

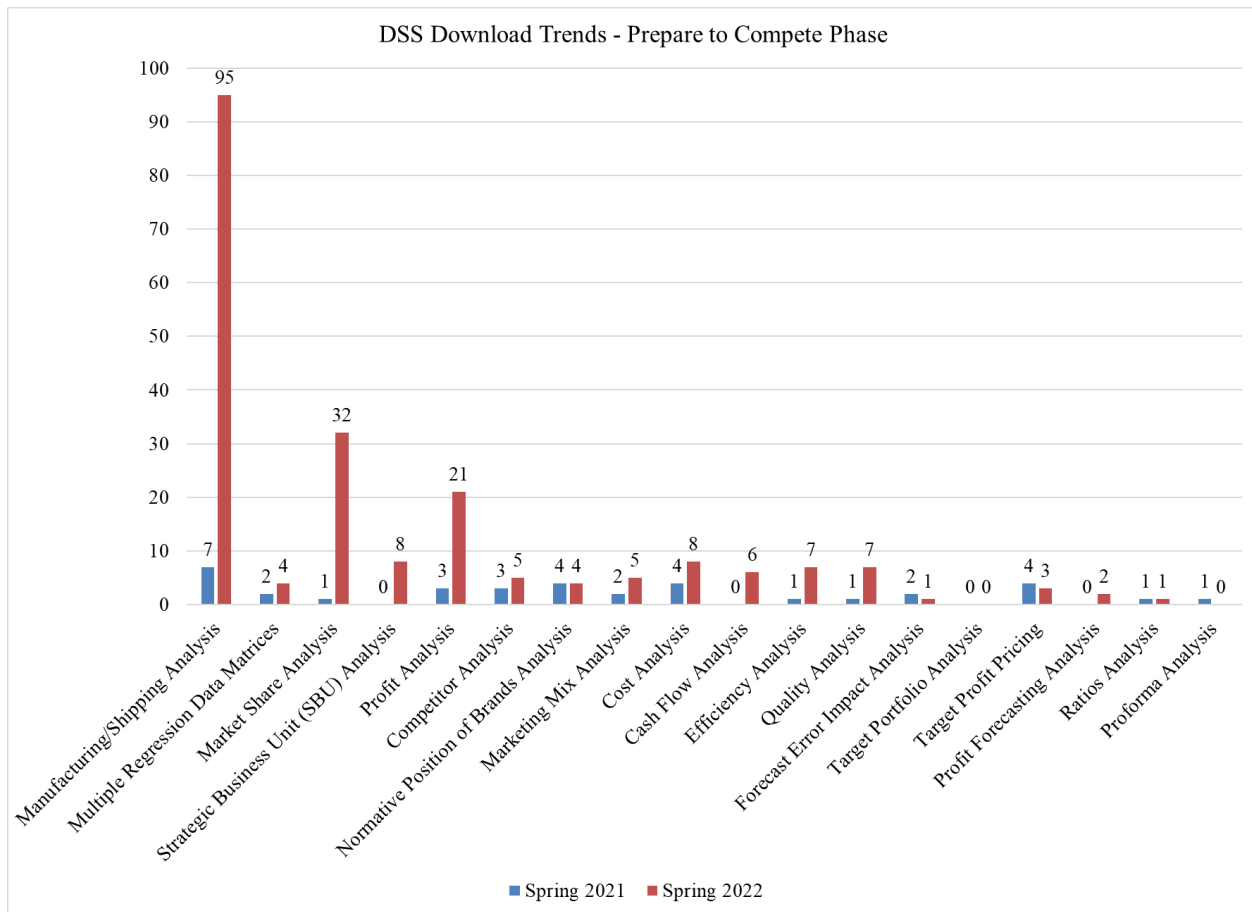
- SBU analysis from 0 (Spring 2021) to 8 (Spring 2022),
- cost analysis from 4 to 8,
- efficiency analysis from 1 to 7,
- quality analysis from 1 to 7, and
- cash flow analysis from 0 to 6.

Early use of these dss packages enables simulation participants to analyze and better understand the antecedents of team performance before the start of competition in the subsequent ‘Compete’ phase (see Exhibit 14).

Then, during the 6.5 week ‘Compete’ phase (weeks 4 to 10) participant teams enter 12 sequential quarterly decisions (D1 to D12). They are progressively introduced to online resources including all dss packages, dss-demo videos, and dss-related articles. Topics covered include market segmentation analysis, sample VALS and VALS2 psycho-geo-demo-graphic segmentation data, online strategic market planning with the Boston Consulting Group (BCG) growth share and growth gain matrices tied to simulation performance data, and sales forecasting with multiple regression analysis (see exhibit 2). Individual participants submit WWA2 on ‘Market and Consumer Trends’ (week 4), WWA3 on ‘Report Introduction’ (week 5), WWA4 on ‘Mission Statement’ (week 6), WWA5 on ‘Positioning Strategy’ (week 7), and WWA6 on ‘Brand Portfolio Assessment’ (week 10).

Participants use multiple regression analysis to prepare a sales forecast for at least one SBU in D12. First, two categories of ‘extending past behavior’ and ‘predicting future behavior’ sales forecasting (yellow) techniques are covered in class. Next, the assumptions, process, and usage of multiple regression analysis (yellow) to forecast SBU sales. Then, the multiple regression data matrices package is demonstrated and later used by participants to extract the first 11 periods of data on unit sales, price, advertising, salesforce, quality, average competitor price, average competitor advertising, average competitor sales force, average competitor quality, and seasonal variation index for each of the 9 SBUs from D11 simulation performance results.

EXHIBIT 14
DSS Usage Trends – Prepare to Compete Phase



Later, during the hands-on session on sales forecast model building (yellow), they use the extracted SBU data matrices to build and assess the value of multiple regression sales forecasts for each SBU. They enter the final D12 shipments for at least one SBU based on the multiple regression sales forecast and report on the accuracy of the sales forecast during their team presentation (see Exhibit 15). At the end of the ‘Compete’ phase, participant teams are provided intermediate simulation debriefing via the cumulative ‘End-Game Performance Package’ to analyze simulation results, and to prepare the team presentation and individual SMP Report during the subsequent ‘Report & Present’ phase.

EXHIBIT 15
Multiple Regression & Sales Forecasting – Compete Phase

Tuesday	3/1/2022	13	15	28	D9-S3	Sales Forecasting
Wednesday	3/2/2022		15	15		
Thursday	3/3/2022	42	40	82		Regression
Friday	3/4/2022		7	7	D10	
Saturday	3/5/2022		9	9		
Sunday	3/6/2022		6	6		
Monday	3/7/2022		61	61		
Tuesday	3/8/2022	129	94	223	D11	Hands-On Session 3 - Sales Forecast Model Building

The early introduction of dss packages in Spring 2022 resulted in increased usage of:

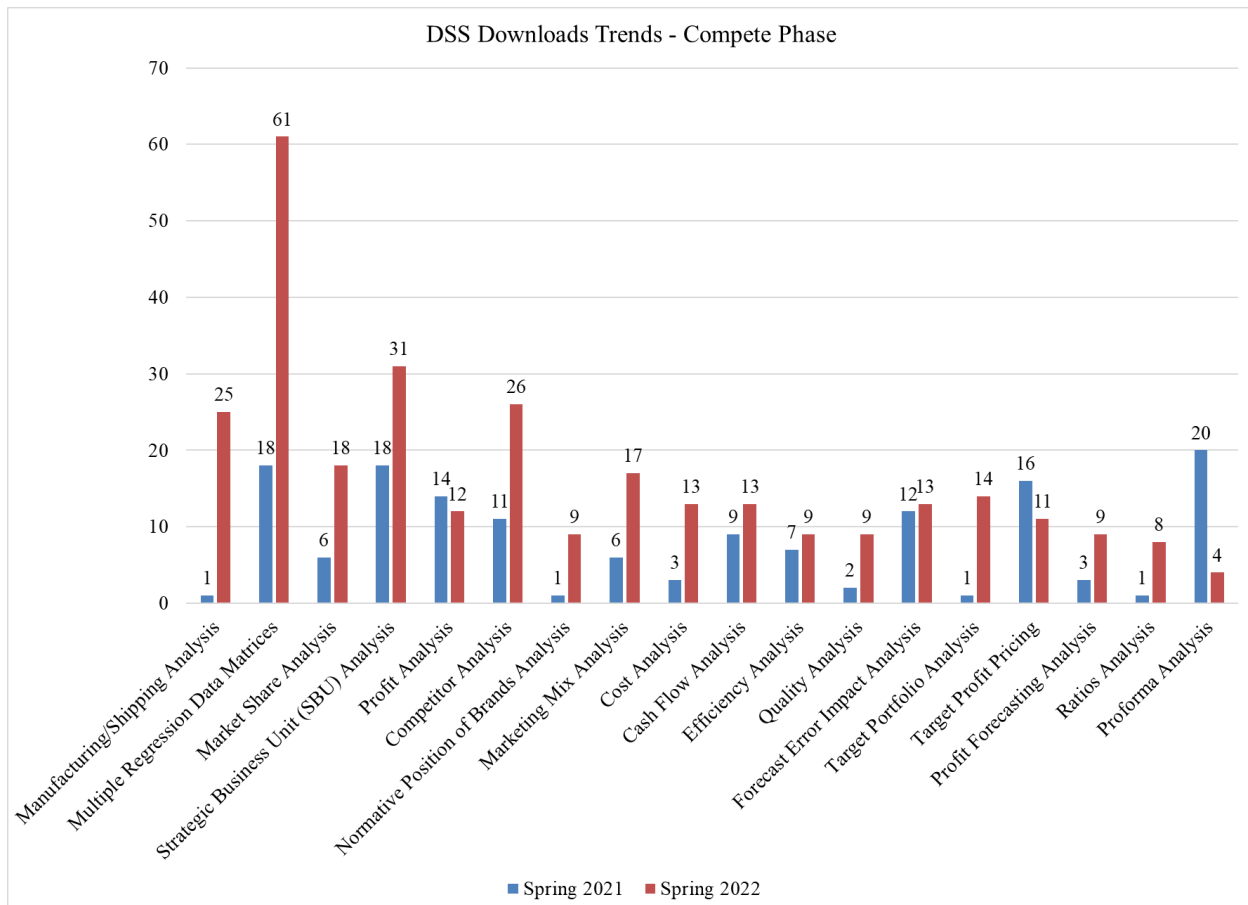
- multiple regression data matrices from 18 in Spring 2021 to 61 in Spring 2022,
- SBU analysis from 18 to 31,
- competitor analysis from 11 to 26,
- manufacturing/shipping analysis from 1 to 25,
- market share analysis from 6 to 18, and
- marketing mix analysis from 6 to 17

during the 6.5 week ‘Compete’ phase (see exhibit 16).

In addition, participants increased usage of:

- target profit analysis from 1 to 14,
- cost analysis from 3 to 13,
- cash flow analysis from 9 to 13,
- forecast error impact analysis from 12 to 13,
- normative position of brands analysis from 1 to 9,
- efficiency analysis from 7 to 9,
- quality analysis from 2 to 9,
- profit forecasting analysis from 3 to 9, and
- ratios analysis from 1 to 8.
- In contrast, participants decreased usage of:
- profit analysis from 14 to 12
- target profit pricing from 16 to 11, and
- proforma analysis from 20 to 4 (see Exhibit 16).

EXHIBIT 16
DSS Usage Trends – Compete Phase

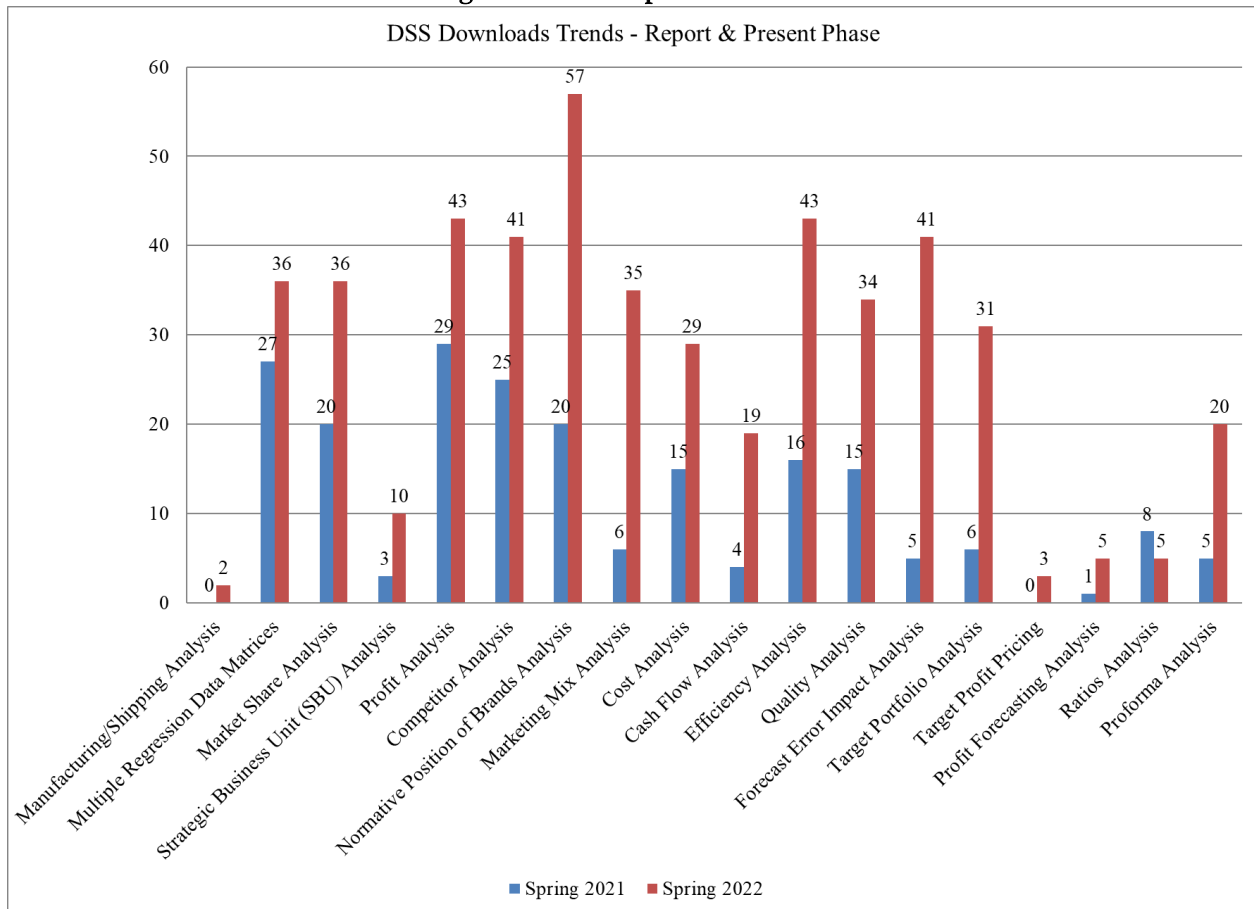


Later, during the 5.5-week ‘Report & Present’ phase (weeks 10 to 15), individual participants submit WWA7 on competitor brand portfolio assessment (week 11) and commence work on their individual reports. In addition, participant teams commence preparation of their team presentations. Topics covered include the six steps of the strategic market planning process – check internal balance, look for trends, analyze competitors, consider other factors, develop target portfolio, and check financial balance. DSS packages used include PPA and PPM graphics, the normative position of brands, competitor analysis, cash flow analysis, target portfolio analysis, and proforma analysis. Peer-graded one-hour team presentations are scheduled during weeks 14 and 15 (see Exhibit 2).

Early introduction of dss packages in Spring 2022 resulted in increased usage of:

- normative position of brands analysis from 20 in Spring 2021 to 57 in Spring 2022,
- profit analysis from 29 to 43,
- efficiency analysis from 16 to 43,
- competitor analysis from 25 to 41,
- forecast error impact analysis from 5 to 41,
- multiple regression data matrices from 27 to 36,
- market share analysis from 20 to 36,
- marketing mix analysis from 6 to 35,
- quality analysis from 15 to 34,
- target portfolio analysis from 6 to 31,
- cost analysis from 15 to 29,
- proforma analysis from 5 to 20,
- cash flow analysis from 4 to 19,
- SBU analysis from 3 to 10,
- profit forecasting analysis from 1 to 5,
- target profit pricing from 0 to 3,
- manufacturing/shipping analysis from 0 to 2, and
- ratios analysis from 8 to 5 (see Exhibit 17).

EXHIBIT 17
DSS Usage Trends – Report & Present Phase



The least used dss packages profit forecasting analysis, target profit pricing, manufacturing/shipping analysis, and ratios analysis are of limited use during the ‘Report & Present’ phase after completion of the simulation. Participant teams work with

the dss packages, seek clarifications on process and analysis, and commence the creation of team presentation slides as well as analysis exhibits for their individual SMP reports.

Finally, during the 1-week 'Wrap-up' phase (week 16), individual participants complete and submit their individual SMP reports in lieu of the final exam. Early introduction of dss packages in Spring 2022 resulted in increased usage of:

- normative position of brands from 0 to 17,
- marketing mix analysis from 0 to 9,
- target portfolio analysis from 0 to 7,
- competitor analysis from 0 to 6,
- proforma analysis from 0 to 6, and
- cash flow analysis from 0 to 5

These dss packages are critical for analysis of past performance and development of a strategic market plan (SMP).

Normative position of brands is used to:

- check the internal balance of the product portfolio (step 1),
- look for trends in the product portfolio (step 2), and
- analyze competitor product portfolios (step 3).

Target portfolio analysis is used to:

- develop a target product portfolio (step 5), and
- adjust the target product portfolio, if necessary, after checking the financial balance (step 6).

Competitor analysis is used to:

- perform strategic (SWOT) analysis, and
- analyze competitor product portfolios (step 3).
- Proforma analysis is used in budgeting when developing a future target product portfolio (step 5), and
- Cash flow analysis is used to check the financial balance (step 6) based on proforma projections.

In addition, participants increased usage of:

- market share analysis from 0 to 3,
- forecast error impact analysis from 0 to 3,
- profit analysis, regression data matrices, and SBU analysis from 0 to 1 (see Exhibit 18).

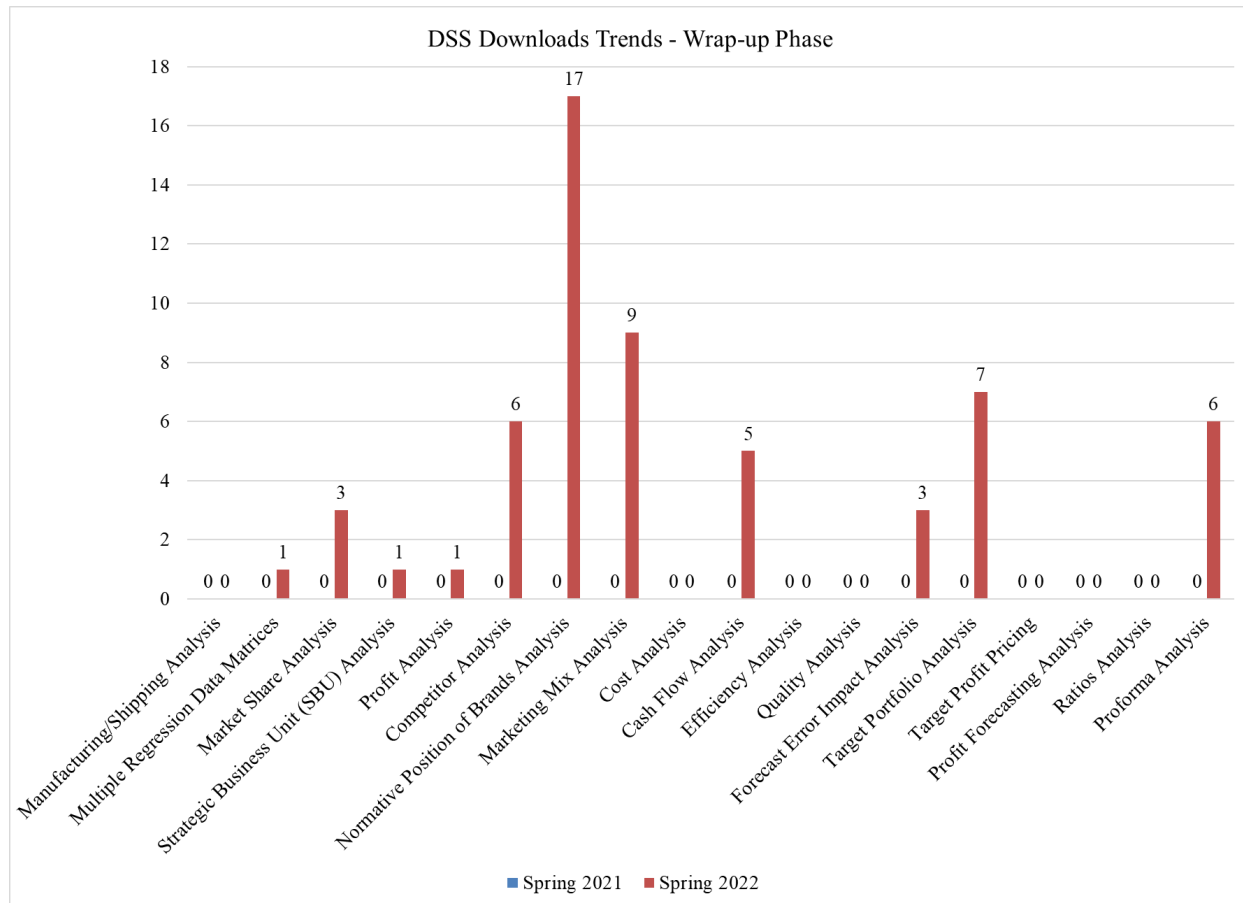
In summary, tracking data reveal that simulation participants use relevant online PPM and PPA graphics and dss packages tied to (a) course assignments, (b) trial decision (TD1-4) and decision (D1-12) deadlines, (c) weekly writing assignments (WWAs), and to prepare their (d) team presentations and (e) individual SMP reports. Further, the early introduction of online graphics and dss packages augments relevant dss usage in each simulation phase.

STRENGTHS AND LIMITATIONS

This disaggregated longitudinal trend analysis of decision support-induced engagement during Spring 2021 and Spring 2022 is limited by a small sample size. While course, semester, instructor, day, and time are the same in both years, the study can be replicated with a larger sample size. Additional treatments and controls can be implemented to account for differences in sequence and timing of dss introduction on cognitive, affective, and behavioral engagement and learning. Further, operationalization of the key constructs, dss usage, engagement, and learning can be refined.

Positive anecdotal student feedback was received at the end of the Spring 2022 semester. Some participants reported that the early introduction of dss packages accelerated learning and that the decision support packages were useful and helpful. They indicated that the automatic extraction feature saved a lot of time that would otherwise be necessary to identify, enter and compute the necessary figures. They hoped that it would continue to be used in the future as it definitely made a difference.

EXHIBIT 18 DSS Usage Trends – Wrap-up Phase



Admittedly, integrated strategic market planning is a complex iterative task that requires considerable effort, judgment, and experience. The user needs to monitor the performance of their SBU portfolio as well as the SBU portfolios of their major competitors over several years, interpret and analyze the results, and formulate a strategic market plan. Despite these limitations, the dss packages are simple yet powerful web-based user-centered learning tools that extract relevant data from the simulation results, preclude data entry errors, and save considerable time involved in identifying and entering relevant data. Yet, to maximize learning, and actualize the potential of the dss packages, the instructor needs to (a) explain the purpose, significance, assumptions, usage, and limitations of the dss packages, (b) require the inclusion of a sample analysis in a team report and/or presentation, and (c) test students on their understanding of the underlying concepts.

CONCLUSION

Portal and website tracking of dss usage by simulation participants tied to course assignments and schedule during Spring 2021 (n=34) and Spring 2022 (n=37) semesters indicate enhanced student engagement during all simulation phases following the early introduction of dss packages in Spring 2022 based on prior student suggestions.

Despite the job demands of decision-making in a dynamic, complex, and uncertain simulation environment with incomplete information under time pressure, simulation participants exercise control via decision authority, autonomy, flexibility, and discretion in decision-making, and are provided with scaffolding support as and when needed. They access online dss packages, dss-related articles, and dss demo videos when needed, in order to improve team performance. Heavy job demands are offset by 24/7 access to online dss resources, decision-making control, and scaffolding support provided.

Early demonstration of the online PPM graphics package in Spring 2022 during the ‘Startup’ phase resulted in an increased generation of product positioning maps (PPMs) used in segmentation and positioning during the ‘Prepare to Compete’ and subsequent simulation phases. In addition, early demonstration of the BCG growth share and growth gain matrices used in strategic market planning after two years of operation (D8) resulted in increased generation of the BCG matrices during the

'Compete' and subsequent simulation phases. Further, early introduction and progressive demonstration of the Excel-based dss packages in Spring 2022 during the 'Startup' and 'Prepare to Compete' phases resulted in a substantial 56% increase in total website page views in all simulation phases.

The results support (a) the National Research Council (2003) prescription that dss-induced user autonomy, relatedness, and competence foster engagement, (b) the JDCS Model (Karasek 1979, Karasek et al. 1982) proposition that heavy workload demands under time pressure on simulation participants can be offset by a range of decision-making freedom via 24/7 availability of and access to dss packages tied to the simulation, (c) the JDR Model (Demerouti et al. 2001, Baaker & Demerouti 2007) proposition that job demands perceived as challenges are positively related to engagement, and (d) the Argyris' Organizational Development Intervention Model (Argyris 1970) proposal that valid information generation and free, informed choice can lead to a lasting commitment to engagement and learning.

In addition, the results confirm that accelerated engagement and learning are enhanced by (a) early introduction of decision support, (b) scaffolding support (Hogan & Pressley 1997) via 24/7 access to dss-related articles and dss demo videos, and clarification of concepts when needed, (c) collaborative learning (Bandura 1997) via team strategy discussion and decision making, (d) problem-based learning (Anderson & Lawton 2004) via thinklets posed in class, and simulation participation, and (e) co-creation of value (Vargo & Lusch 2004, 2014; Geddes et al. 2015, 2017) via listening, learning, responding to, and implementing participant suggestions.

In summary, the early introduction of dss packages and trimmed dss videos tied to the business simulation, 24/7 access, scaffolding support, and phased simulation debriefing accelerated and boosted overall participant engagement throughout the simulation competition. The ability to monitor results, identify problems, use relevant dss packages, understand the reasons for sub-par performance, take corrective action, and improve performance, heightens interest, motivation, confidence, and understanding among simulation participants.

Given the current AACSB International mission "to foster engagement, accelerate innovation, and amplify impact in business education," and the enhanced engagement and motivation of simulation participants based on phased simulation debriefing and early introduction of decision support based on student suggestions, ABSEL is well positioned to play a leading role in the innovation and dissemination of simulation and experiential learning pedagogy in business education.

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