MaCuDE
Management Curriculum for the Digital Era

Marketing Disciplinary Task Force
Phase I Report of the MaCuDE project[1]

Report on the Current State of Curricula in Marketing

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Developing the Management Curriculum for the Digital Era (MaCuDE)

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Executive Summary

- Digital transformation is changing every function in business, including marketing. As a result, new skills are needed, and Business Schools are rapidly moving to develop new content and adopt to online delivery.
- Digital content in marketing courses may be prioritized into four buckets: 1) digital marketing tools, 2) marketing analytics, 3) communications, branding and CRM, and 4) ethics.
- Digital marketing tools are currently covered with the greatest frequency overall, with equivalent frequency in undergraduate versus graduate programs.
- Marketing analytics (and specialized topics within it, such as Artificial Intelligence and network analytics) is arguably the highest priority topic bucket and represents a key "catch up" objective mid-tier (vs. top tier) schools.
- Communications, branding and CRM cover a wide range of important marketing functions that have been deeply transformed by the digital technologies.
- Ethics is covered rarely and tends to be offered as a module within courses that primarily emphasize digital marketing tools or marketing analytics.
- Three key challenges facing greater adoption of digital content in marketing are: 1) student skill heterogeneity (students vary widely in pre-class technical skills), 2) school resource availability (schools vary widely in the monetary and personnel resources necessary to deliver digital content), and 3) learning goal complexity (the difficulty in training students to apply analytic tools to specific business problems).
- Four recommendations are: 1) Emphasize the strategic focus, 2) use open-source software, 3) teach coding, and 4) teach ethics.

I. Introduction

Marketers are living through an unprecedented time of transformation, hinging on a massive increase in the acquisition and depth of information about consumer preferences and unlocking a more efficient targeting of both marketing communications and product development. More efficient targeting brings superior revenue and long-term growth. The skillsets required for managers to compete in this information-dense marketplace are transforming as well, necessitating a reconsideration of what optimally is taught by business school marketing courses and programs. The purpose of this report is to examine the current state of marketing course and program offerings at the degree program levels of undergraduate, MBA, Master's and executive education as a first step toward designing the digital curriculum of the near future, one that will better prepare business students to excel in careers in the digital marketing economy. The methodology includes a representative sampling of current business school course offerings which permits an estimation of the rates at which key digital skills and technologies are now taught.

II. Background: The Digital Marketplace

Strategic versus tactical focus.

The digital transformation has been vast, but it has not fundamentally changed the basic structure of the business model, which represents an exchange of value between two or more entities. A sustainable business model depends on a fair exchange of value between the company, the customer, and collaborators. Although there exist innumerable ways to demarcate the business model, one useful way is to separate the strategic from the tactical sides of business decisions.

On the strategic side there is the key articulation of how value is provided to the customer by the company, and how the value provided by the company is superior to the value offered by competitors. The marketing strategy includes a detailed articulation of the target customer (understood through the logic of segmentation along demographic, geographic, or psychological variation).
On the tactical side we have the specific ways in which market activity brings value to the customer, which usually includes such decisions as product design, service design, pricing, incentives, communication, and distribution.

Using this strategic versus tactical lens, we can see that a great deal of digital course content in marketing is primarily tactical in its focus on marketing communication (e.g., content marketing, social media, etc.). All else being equal, the tactical side typically receives stronger emphasis in undergraduate programs, whereas the strategic side is emphasized to a greater extent in MBA programs.

A challenge in considering the digital marketplace is that there are at least two different ways of defining digital content. Specifically, digital can mean the use of current technology tools (like social media monitoring), or it can mean data-driven decisions-making (involving statistical inference). Social media, as an example of technology use, is now tightly integrated into company communications, yet despite its importance, it is used with a tactical business focus in terms of marketing communications.

Nevertheless, Facebook, LinkedIn, Twitter, Instagram and other platforms are immediate and powerful ways to reach customers, and to fully leverage the power of social media requires the ability to navigate among the wide range of platforms and to determine which among them are relevant to the company.

The key point is that a focus on such digital tools should not be purely a function of tactical concerns, nor should it be restricted to undergraduate courses. Rather, for each program some consideration of the balance between strategy and tactics in course content must drive course programming. Undergraduate students need at least some instruction in strategy, and MBA students ideally should attain a substantial understanding of the mechanics of marketing tactics.

Thematic organization of course content.

A useful concept in organizing marketing course content is the notion of the customer decision journey, which refers to the mental states that a customer may pass through from initial interest, to search, to purchase, and then either to repeat purchase or further search. The decision journey has conceptual roots in the psychological understanding of the decision process, but is now more transparent due to the availability of data that are informative of which the current phase of the customer's journey a particular customer is currently in. There are some courses organized entirely around customer journey analytics, aimed at tracking and analyzing the way customers use combinations of channels to interact with an organization.

Another key facet of contemporary marketing that has been transformed by the digital revolution is content management. Content Management may be distinguished in terms of a) content that helps enhance the customer experience (external-facing) vs. b) content that is critical to a business process (internal-facing). Examples of external-facing processes include web content management, digital asset management. Examples of internal-facing processes include enterprise document management, cloud storage, and search. Within content management, key advances include application of machine learning, natural language processing, text analysis, image/video recognition. This brief overview of the digital transformation of the marketing landscape gives context to the next section, which provides a snapshot of current course offerings in digital marketing.

III. A Snapshot of Current Program and Course Offerings

Program Offerings.

The digital transformation has triggered the development of new courses that enrich the traditional undergraduate, MBA, or Master's in Marketing programs. In addition, a number of schools have developed new programs to address the new digital era. For example:

- At the undergraduate level, schools have taken different approaches to address the needed curricular changes in the core curriculum of the major, or in concentrations. For example, NYU Stern has developed a track in Digital Marketing with courses such as Data Analytics in Digital Marketing, Networks, Crowds, and Markets, Data Mining for Business Analytics, Digital Business Strategy, Digital Marketing, and Decision Models and Analytics. Similarly, Stevens Institute of Technology has transformed their traditional Marketing major to a major in Marketing Innovation and Analytics with courses such as Marketing Strategy in a Digital World, Market Analytics & Research, Social Media and Network Analysis, Virtual and Physical Consumer Behavior, and Data Analytics. On the other hand, the University of Missouri is offering an Undergraduate Certificate in Marketing Analytics, where the student has to take courses such as Analyzing and Communicating Business Data, Data Analytics and Machine Learning for Business, Data Visualization, Databases for Marketing Decisions, Data-based Decision Making in Marketing.

- Similar to the undergraduate level, at the MBA level, schools have followed different approaches to address the needed curricular changes for the Marketing discipline. For example, NYU/Stern has added (in addition to the specialization in Marketing) a specialization in Digital Marketing, MBA-Digital Marketing with courses such as Design and Development of Web and Mobile Applications, Digital Marketing, New Media in Marketing Networks, Crowds & Markets: Reasoning about a Highly Connected World, Search and the New Economy, Social Media for Brand Management, and more. The University of Illinois at Urbana Champaign is offering (jointly with Coursera) an MBA Specialization in Digital Marketing, comprised of 7 courses as follows: Marketing in a Digital World, Digital Marketing Analytics in Theory, Digital Marketing Analytics in Practice, Digital Media and Marketing Principles, Digital Media and Marketing Strategies, Marketing in an Analog World, and Digital Marketing Capstone. Similarly, Montclair State University is offering a specialization MBA – Digital Marketing with courses such as Social and Mobile Media, Digital Customer Experience Management, Integrated Digital Advertising Planning across Multiscreen, Hyper-targeted Media, Omni-Channel Retailing, or Digital Marketing Strategy and Return on Digital Marketing Investment. On the other hand, Northwestern/Kellogg is offering a Data Analytics Pathway in the MBA program, which includes a number of analytics courses related to Marketing – see appendix 1.
- At the Master's level, all schools have enriched their Master's in Marketing curricula with courses with digital/analytics content. In addition, new "dedicated" programs or certificates have been launched to address the digital transformation in Marketing. For example, Rutgers University is offering a Master's in Digital Marketing, American University is offering a Master's in Marketing Analytics, INSEEC is offering a Master's in Marketing and Brand Management, and EM Lyon in France is offering a Master's in Digital Marketing and Data Science. On the other hand, other schools are infusing their MS Analytics programs with Marketing Analytics courses. For example, Stevens' MS in Business Intelligence and Analytics program includes two Marketing courses (Marketing Analytics and Social Network Analytics) among the core courses of the program.
- Topics around Digital Marketing are also popular in executive education, and a plethora of schools offer certificate programs in these areas. For example: Northwestern/Kellogg is offering a Professional Certificate in Digital Marketing and a Certificate on Digital Strategies and Analytics; Penn/Wharton is offering a Digital Marketing Certificate; NYU/Stern is offering a Certificate or Certificate on Digital Marketing (jointly with FaceBook); MIT/Sloan is offering a Certificate on Digital Marketing Analytics; Yale/SOM is offering an 8-module Certificate on Digital Marketing: A Strategic Perspective; Harvard/HBS is offering a Certificate on Digital Marketing Strategy, and many more. We should also note here that the MOOC platforms also offer many programs in topics related to Digital Marketing, see, e.g., edX's MOOC in Marketing Analytics.

Course Offerings.

Although a great many course offerings in marketing span a diverse range of topics, we identified four content buckets of particular interest. In decreasing order of both overall frequency and academic degree emphasis, these are:

1) Digital marketing tools. They are the most frequent course topic and appear prominently in undergraduate degree programs.
2) Marketing analytics. These are also very frequent and are more often represented in MBA and other Master's degree programs;

3) Communications, Branding and CRM. This is a less frequent but still important group of courses that appear in both undergraduate and graduate courses; and
4) Ethics courses. Unfortunately, entire courses on ethics are rare at any level of degree program.

Below are comments about each of these four buckets of course content.

1) Digital marketing tools.

This content bucket captures a variety of tactical tools for advertising and selling. For example, it includes detailed consideration of social media channels, search engine optimization, mobile (e.g., geo-location as a segmentation tool) marketing, and influencer marketing. Content may include tools for search engine optimization (SEO) or site optimization, tools for improving the quality and quantity of website traffic such as Google Analytics, hands-on training in running an Instagram (or other social media) account so as to gain experience in digital activation, development of web or mobile applications, and more. NYU Stern offers a number of courses in this category; see for example, New Media in Marketing, or Digital Marketing, or Social Media and Mobile Technologies or Design and Development of Web and Mobile Applications (all from NYU/Stern). Other universities offer similar courses as well. See, for example Media Technologies (Macquarie U), Social Media Marketing (Mannheim Business School), Digital Marketing (EM Lyon), Quantitative Digital Marketing (Dartmouth/Tuck), or Entrepreneurial Tools for Digital Marketing (Northwestern Kellogg).

Some schools have developed specific Digital Marketing lab courses where they teach the students the tools needed for the above techniques. See for example, the Digital Marketing Lab (Chicago/Booth) or the Foundations of MarTech (Santa Clara/Leavy).

Overall, the emphasis is at the tactical rather than strategic end of marketing management. Some schools tend to have duplication or overlap of content across courses within and across degree programs. Many schools possess Master's degree programs that are distinct from the MBA and which seem to contain the bulk of digital course offerings (see previous section). As a further instantiation of digital marketing tools, many schools have a course centering on marketing research which has a component of consumer data aggregation and analysis. Of the schools examined, NYU Stern has among the most comprehensive of digital curriculum spanning undergraduate and graduate courses.

2) Marketing Analytics.

This content bucket captures a wide range of courses that center on analytical methods deployed to shed light on marketing decisions. In almost all schools there exists one or more courses that serve as overview courses in the area of analytics for marketing decisions. See for example, Analytics I & II (a sequence of two analytics MBA courses at Dartmouth/Tuck), Applied Business Analytics (Harvard/HBS), or Business Analytics: Data, Models and Decisions (Stevens).

Then, there are general Analytics courses for the Marketing function. See, for example, Data Driven Marketing or Digital and Algorithmic Marketing (both at Chicago/Booth), Algorithmic and Digital Marketing (Stanford), or Critical Thinking in Digital and Social Media Marketing (Northwestern/Kellogg).

Finally, there are plenty of courses that focus on the analytics of customer behavior, such as Retail Analytics and Pricing, Consumer Analytics and AI (both Northwestern/Kellogg) or Customer Analytics (Dartmouth/Tuck).

There are also more specialized courses, such as Programmatic Advertising (Santa Clara/Leavy). Many schools have developed courses on Web Analytics (e.g., Stevens).

Another common approach is from a platform of economics with tools such as regression used to make judgments on pricing or messaging. Courses may be structured in terms of 3 considerations: 1) predictive, 2) prescriptive, and 3) decision quality. Some examples are Marketing Analytics (Penn/Wharton), Data Mining for Business Analytics (George Mason U), or Predictive Analytics for Big Data (SDA Bocconi).

Further, content ideally also covers the issue of data quality (and ways to prepare unstructured data for statistical analysis), impediments to causal inference, and data exploration (including data visualization). Although not explicitly stated in many course descriptions, at least some subset of courses appears to require rudimentary coding skills, for example, programming in Python and R. A number of courses are offered on data management and visualization with tools such as Tableau. See, for example, Data Manipulation and Visualization (HEC Paris), Data Visualization (EM Lyon), Database Querying and Visualization (Towson U), or Data Visualization and Performance Analytics (St. Joseph's U/Haub).

In terms of specific analytic techniques, in exploring the course descriptions empirically we focused specifically on mentions of Artificial Intelligence (AI), machine learning (ML, with the understanding that ML is a subset of AI but that many course descriptions note either one or the other), neural net (and deep learning), and network analytics. See, for example, Customer Analytics and AI (Northwestern/Kellogg), AI in Market-facing Functions (Harvard/HBS – a new course taught by a faculty member accompanied with two executive fellows with significant industry experience), Marketing Research (Stanford), or Marketing Analytics (UC Berkeley/Haas).

3) Communications, Branding and CRM.

Communications have changed drastically with the digital era. Engaging with customers while building trust over time by consistently delivering value and exceeding expectations is of paramount importance. The new media with the Internet, Web 2.0, social networks, search engine marketing, mobile and blogs are changing the way we do things. Integrating message across platforms, channels and media is essential to successful branding and meeting corporate objectives. A number of courses are available, see for example, Integrated Marketing Communications and Branding (U of Hull), Integrated Marketing Communication (Santa Clara/Leavy), or Integrated Marketing Communications (Macquarie University). To equip students with better writing communication skills in the digital era, Melbourne Business School is offering a course Writing and Editing for Digital Media. To take advantage of the abundance of data and the importance of visualization in communication, Northwestern/Kellogg is offering a course Visualization for Persuasion. NYU/Stern is offering a similar course, combining storytelling with numbers: Narrative and Numbers.

Branding has also changed in the digital era. Digital Branding today is done via certain digital platforms such as the web, mobile applications, social media and, of course, with digital media content that includes website content, blogs, videos, e-mailers, etc. for the specific target group. A number of courses are being offered to address branding in the digital era. See, for example, Branding in the Digital Era (Stanford), or Branding in the Age of Digital (CEIBS). A number of schools are offering courses on advertising in the digital era. See, for example, Advertising 3.0-Communication in the Digital Era (NYU/Stern), Online Advertising (U of Queensland), or Digital Advertising (U Santa Clara/Leavey).

A related area that has changed with the digital era is Customer Relationship Management (CRM). With the increasing popularity of social media platforms, the availability of data from various other resources, and the growth of specialized software products, companies today can enhance their relationship with customers, and use CRM concepts and tools for better customer segmentation, increased connectivity with their customers, and a more personalized and automated approach in their marketing efforts. A number of courses are offered to address CRM in the digital era. See for example, CRM, Data Platforms & Marketing Automation (EM Lyon), CRM – ICHEC – CRM and Data Marketing (ICHEC), or CRM and Business Intelligence (SDA Bocconi).

4) Ethics.

There is no doubt that ethics is a subject increasingly in demand in Business Schools. The Business Roundtable, a group of CEO's and other senior leaders from 236 of the biggest companies in the USA – including Amazon, Apple, AT&T, Cisco, Coca-Cola, ExxonMobil, General Motors, JPMorgan, Goldman Sachs, IBM, Microsoft, Procter & Gamble, Walmart and many others – signed a statement of purpose back in 2019 (and since then reconfirmed it several times including February 2021), where they explicitly state that they are committed to all their stakeholders to, among others, deal with transparency, deliver value to their customers, deal fairly and ethically with their suppliers, and support their communities.

This shift from the traditional objective to maximize returns has been reflected in a 2019 study to prospective business students by CarringtonCrisp, reported in AACSB's BizED Magazine, where the subject of ethics now ties in the fifth most popular position (together with business forecasting and modeling) behind big data, accounting, finance, and business law. The study concluded that prospective master's students represent "a new generation of business students with a growing interest in responsible management."

As a result of this growing interest, Business schools increasingly offer Ethics in their curriculum, either a stand-alone course, or as part of a module, usually on Leadership. For example, Harvard Business School includes in its core curriculum a module on Leadership and Corporate Accountability, as well as a course entitled The Moral Leader; Northwestern Kellogg is offering a course entitled Ethics and Leadership; Yale is offering a Business Ethics MBA course; and many more. Ethics and leadership courses are also offered by other schools within a University, e.g., Harvard's Kennedy School offers a program on Leadership and Ethics, and Northwestern's Weinberg College of Arts and Sciences offers an area of studies on Ethics and Values. Other schools follow an alternative approach, e.g., at Stevens the subject of Ethics is approached across a number of courses, and students have to take an Ethics Quiz to demonstrate their ethical reasoning. Ethics can also be found in Analytics courses, to discuss issues of ethics in decision making.

The increasing interest in Ethics is also due to a certain extent to the rise of digital technologies. As an example, the consideration of ethics extends to the rise of autonomous vehicles, such as self-driving automobiles. In this latter instance, the question of who is to blame following a vehicular accident (is it the vehicle's software designer, the vehicle's owner, or does the vehicle itself contain sufficient agency to be considered "blameworthy") constitutes a difficult ethical quandary. Legal frameworks are relevant and are sometimes taught alongside ethics, but clearly the law and an ethical judgment represent distinct issues and objectives.

In the area of Marketing, this content bucket includes any consideration of the ethical angle to usage of customer data. Key aspects of ethics content will include the importance of honesty, privacy (consent issues when collecting information online), respect (how it is easy to forget you are talking to a person because of the screen issue), responsibility (how marketers must acknowledge all situations, apologize and act on a solution), as well as social media etiquette.

Unfortunately, not many courses exist to examine ethics for the Marketing professional. One of the few example of a standalone ethics courses in a Marketing curriculum is from Rutgers University entitled Digital Marketing Law, Policy and Ethics with the following course description: "provides a basic understanding of the laws and regulations applicable to digital marketing as well as introduce ethical frameworks that can be leveraged to enhance marketing strategies, communications and business decisions; … provides an in-depth study of the areas of law and ethics that are most critical to digital marketing business judgment and decision making."

European schools take a stricter approach to ethics issues, as a reflection of their respective nation's stance on data privacy, with ethics content more likely to appear as a specific course topic combined with topics around sustainability and corporate social; responsibility. As an example, INSEAD includes a course in its core MBA curriculum a leadership course entitled Ethics: Value-based leadership for cosmopolitans, as well as another core course entitled Business and Society, which includes a module on Ethics, as well as another ethics-based course. HEC Paris offers a course on Ethics and Sustainability, and ESADE a course on Business Ethics and CSR. The Manchester Business School has launched a Seminar series on Business Ethics, Social Responsibility and Sustainability, EM Lyon is offering a course on Responsible Artificial Intelligence, while IESE has established an entire Department of Business Ethics.

IV. A Quantitative Estimate of Digital Course Content[2]

Digital course content in marketing courses worldwide was estimated using a sample of schools intended to enable comparisons as a function of degree program (undergraduate vs. MBA vs. other Master's), global region (Norther America vs. Europe vs. Asia), and tier (top tier vs. mid-tier; with top tier identified by top-100 schools in the Economist global ranking and mid-tier identified by schools not ranked in the top 100 and sampled randomly from the AACSB membership list). The resulting sample included 31 schools for undergraduate business programs, 42 MBA programs, and 27 Master's (non-MBA) programs. Overall, the sample included 319 courses. The vast majority of courses (92%) were in-person as opposed to online. The complete list of programs included in the sample is in Appendix 2.

Courses were selected for inclusion if they had a marketing designation and if they had some suggestion of digital, technology, or market research focus. The key content analyses centered on the three key buckets of course content (digital marketing tools, marketing analytics, and ethics). Digital marketing tools included anything involving market research, social media analysis, sentiment analysis, search engine optimization, geo-location, or advertising management related tools. Marketing analytics was unpacked into 4 distinct categories: artificial intelligence, machine learning, neural network (deep learning), and social network analytics. Finally, ethics included any mention of ethics and morality, cybersecurity, and the law.

[2] Raw data for these analyses are posted here: https://docs.google.com/spreadsheets/d/1ybNbbPsT61I9DC4VN3HD-sREqDzy1q4SZA3b6kAm0dI/edit?usp=sharing (data are in tab "Courses"; R code for analyses is in tab "R code").

We next present the analyses as cross-tabulations by program, region, and tier.

Analysis 1: Digital content by degree (Undergrad vs MBA vs Mater's programs)

Turning first to program, results are presented in Table 1. The key take-aways from Table 1 are:

1) Digital marketing tools are the most common focus of digital marketing courses, appearing in more than a third of courses overall,
2) Digital marketing tools are covered with roughly equivalent frequency across undergraduate vs. MBA vs. Master's programs,
3) Specific advanced marketing analytics topics (e.g., AI) are covered rarely across courses, although the number is slightly higher for AI and machine learning at the MBA program level, and
4) Ethics content is rare.

Content	Undergrad	MBA	Master's
Digital marketing tools	32%	37%	40%
Machine learning	3%	8%	1%
Artificial intelligence	4%	14%	4%
Neural net	0	3%	1%
Network analytics	7%	1%	1%
Ethics	7%	2%	5%
N			
Schools	18	14	6
Courses	78	140	91

Table 1 - Digital content by degree
(Percentage of courses containing specified digital content by degree type).

Analysis 2: Digital content by geographic region (N. America vs. Europe vs Asia)

Turning next to analyses by region, results are presented in Table 2. The key take-aways from Table 2 are:

1) Content centering on digital marketing tools is somewhat less common in Asia than in Europe, with North America in the middle, and
2) Content on artificial intelligence is also less likely in Asia than in Europe and North America.

Content	N. America	Europe	Asia
Digital marketing tools	36%	42%	32%
Machine learning	5%	5%	3%
Artificial intelligence	10%	12%	3%
Neural net	3%	1%	0
Network analytics	3%	1%	3%
Ethics	3%	6%	5%
N			
Schools	16	11	11
Courses	117	98	98

Table 2 - Digital content by region
(Percentage of courses containing specified digital content by global region).

Analysis 3: Digital content by tier of school (top tier vs mid-tier schools)

The results of the analysis by tier of school are presented in Table 3. The key take-aways are:

1) Digital marketing tools are covered in both top- and mid-tier schools,
2) Marketing analytics are absent in mid-tier schools, and
3) Ethics content appears to be absent in mid-tier schools.

Content	Top tier schools	Mid-tier schools
Digital marketing tools	38%	29%
Machine learning	5%	0
Artificial intelligence	10%	0
Neural net	2%	0
Network analytics	3%	0
Ethics	4%	0
N		
Schools	29	9
Courses	263	50

Table 3 - Digital content by tier
(Percentage of courses containing specified digital content by tier).

Summary of findings

Summarizing across these analyses, the key take-away is that, of the three key buckets of course content (digital marketing tools, marketing analytics, and ethics), only digital marketing tools is taught with substantial frequency (overall and across degree program, global region, and tier). Marketing analytics topics are better represented in North American and Europe (vs. Asia) and at top tier schools. Ethics content is rare across the board.

V. Recommended Digital Course Content

Having described three key buckets of course content (digital marketing tools, marketing analytics, and ethics), and having presented the relative frequency with which key topics are taught in schools spanning different degree programs, global regions, and tiers, we turn next to a list of potential topics that ought to be covered. This list remains highly tentative, of course, but will serve as input to the next phase of MACUDE information-gathering, which is focus groups among industry leaders.

The recommended course offerings are not broken out by degree program because many of them are ideally suited to be taught at both undergraduate and graduate levels (with corresponding calibration of difficulty level, of course). These topics are compiled within the three buckets.

1) Digital marketing tools

- Logic of digital targeting
- Social media analysis
- Sentiment tracking
- Managing real-time promotions and customized offers based on data-driven customer segmentation
- Search engine optimization

- Managing virtual assistants and chat bots
- Managing omni-channel platforms
- Attribution analytics as input to marketing budget prioritization

2) **Marketing Analytics**

- General statistics (e.g., regression)
- Predictive vs. causal inference
- Causal inference (role, design, and implementation of market experiments)
- AI / machine learning
- Neural net / deep learning
- Social network analytics
- Data visualization
- Coding (e.g., Python)
- Specific statistical software platform (e.g., R)

3) **Branding, Communications and CRM**

- Integrated communications
- Multi-channel marketing
- Digital branding
- Digital advertising
- Media planning
- Content strategy
- Campaign performance measurement and ROI
- Customer data
- Analytical CRM

4) **Ethics**

- Privacy concerns
- "Speedbumps" (human intervention points) for autonomous systems
- Crisis management (writ large and small)

VI. Key Challenges

Having recommended some pivotal digital content for marketing courses today, we turn next to the constraints that may impact the extent to which idealized content may be realized in actual courses. To an extent, we suggest tentative solutions to these challenges as a starting point toward longer and deeper future discussions on implementation. Here we summarize 3 key challenges: 1) Student skill heterogeneity, 2) School resource availability, and 3) Student learning goal complexity.

1) **Student skill heterogeneity.**

The challenge here is that students enter into marketing analytics classes with a wide range in background training and preparation. Some are adept at mathematics, statistical logic, and coding. Other students are "math-phobic" and perhaps lack the most basic understanding of statistical principles. How then might professors optimize class time to minimize boredom among advanced

students and maximize learning among weaker students? Online course delivery may amplify this challenge.

A key to addressing this challenge is the basic data to characterize student proficiency, as in the form of pre-class testing. (That is, self-selection into courses is less than ideal as it contributes to student skill heterogeneity). Such testing might be used to qualify students for a course, but more importantly permits an understanding among professors of the degree of heterogeneity in student preparation that must be managed. Based on an understanding, a solution that is already implemented at some schools is a pre-class "boot-camp" course in which the weaker students are taught remedial topics in such a way as to ensure that each student in the focal course meets a minimal level of proficiency. Boot-camp courses are available in online form from many schools as well as from third parties and may be taught prior to the start of the regular academic year or throughout the year, thus constituting a relatively easy solution to this first challenge.

2) **School resource availability.**

The variability in resources available to schools is a major challenge in formulating recommendations. To put it simply, some schools enjoy abundant resources and have the ability to hire many people and furnish them with cutting edge technology, whereas other schools struggle to provide the most basic infrastructure support (and this challenge will likely be worsened in the aftermath of the Covid-19 pandemic). For example, at one resource-constrained school that we examined, there was the desire to provide training in Tableau, a data visualization tool widely used in industry, but the subscription cost (for both faculty and students) was prohibitive. Resource constraints are partly captured by our comparisons among top versus middle tier schools (as operationalized by The Economist ranking or other ranking schemes). As a result of the Covid-19 pandemic and economic shock, resources are constrained across the board but will likely accentuate the differences between tiers. The financial resources for technology extend also to faculty support, and another resource constraint is faculty adept at new technology.

As digital tools evolve rapidly, the need for faculty time to re-familiarize themselves with constantly evolving technical offerings presents a constant challenge for the scarce resource of time itself. Continuing with the idea of human resources, in addition to faculty time there is the simple need for technical support, and in resource-constrained schools a faculty member might find herself undertaking simple technical maintenance tasks merely to keep a class running.

Two solutions that present themselves to the challenge of school resource availability are: a) emphasis on open-source software, and b) increased faculty partnership with industry. In the first case, the obvious example is R, the statistical analysis platform that entirely open-source and hence free of charge. Not only is R open to all, but it is becoming an industry standard due to its flexibility and its status as preferred tool among data scientists. Nevertheless, R is not easy to learn, and so the promise of open-source software tools as a solution to resource constraints carries with it the further challenge of a difficult learning curve. In terms of the second solution, the increased reliance on sessional teaching faculty with active ties to industry is likely a trend that will continue as a straightforward solution to the challenge of limitations in tenure-line faculty expertise in emerging technologies. As a final note, a number of schools are hiring computer scientists to teach general or specific marketing analytics courses (e.g., web analytics, social media analytics) because it is "easier to teach a data scientist marketing than it is to teach a marketer data science."

3) Learning goal complexity.

The challenge here is deeply existential in that it captures the basic challenge of how best to teach complex topics in a constrained period of time. The increasing complexity and multidisciplinary nature of digital marketing techniques demand formal training as opposed to learning self-taught tools. More specifically, the challenge is how best to apply analytic tools to business problems. The challenge is one that hinges on the limits of student's analogical reasoning, i.e., the ability to learn a set of analytic tools designed to solve specific problems, and then to recognize a new problem as an instance of a general category of problem for which there is analytic tool that may provide a solution. Students often have difficulty in breaking business problem down into manageable units and then applying analytics to help solve the problem. Students must understand the difference between data and evidence, and move beyond being the passive recipients of data (and evidence) provided by others to becoming active designers of data acquisition within the business environment so as to provide themselves with those data that may better provide evidence in support of this or that hypothesis. Closely related is the difficulty in learning the limits to which data analytic tools may be implemented: not all problems can be penetrated with a data-analytic lens.

A partial solution to this challenge is, at the most general level, a pedagogical focus on problem-solving as opposed to tool articulation. That is, the problem orients the learning environment, with analytic tools brought in to shed light on the problem. Further, structuring the course in terms of problems helps to reveal the limitations of data within specific business contexts. A key part of an analytics class ought to be the recognition of limitations of different types of data and how better planning can both simplify the analytics and increase the manager's confidence in the findings.

4) The Key Trade-off.

The key trade-off in designing the curriculum of the future is to balance short-term (tactical) versus long-term (strategic) focus. A short-term focus emphasizes software tools that are available today, whereas a long-term focus emphasizes no specific software package but rather the inferential skills (such as causal inference and an understanding of statistical logic) that ought to last throughout a career. Further, a short-term focus prepares students with skills that may be immediately deployed to solve highly specific problems, whereas a long-term focus by definition has a "longer shelf-life" by may lack immediate applicability. A short-term focus brings immediacy but at the potential cost of blurring useful tools with trendy, irrelevant distractions.

How best to manage this trade-off is a key challenge for any institution. As a general guiding principle, it is reasonable to expect that undergraduate courses will have more of a tactical focus whereas MBA and Master's programs will have more of a strategic focus. Even so, it is essential for all marketing courses to have a strong strategic focus, which emphasizes the guiding principle of value creation that in defines the scope and use of the specific digital or analytic tools to be employed.

VII. Recommendations

The recommendations below are a preliminary first step in the MACUDE process toward articulating the digital curricular needs of the near future. A fundamental goal, we argue, is to create in students an understanding and trust in the digital tools. Because the digital transformation of the marketing world is becoming increasingly sophisticated in its computational architecture, new managers may feel intimidated by the plethora of technical terms. For instance, a data expert may drop a term, and if the

manager does not know the term the tendency may be to accept it without challenge or understanding. Accordingly, a key objective of the new digital curriculum is to create among students a sufficient background knowledge base that permits the new manager to ask intelligent questions.

1) Emphasize the strategic focus. As a general rule, an overarching emphasis on customer centricity is essential to marketing courses. Although a reasonable approach is to emphasize the tactical at the undergraduate level and the strategic at the MBA level, we emphasize the importance of ensuring the strategic guiding principles at all program levels. For example, a course centering on social media communication even at the undergraduate level better prepares students for meaningful work contributions if they understand the strategic framework or "big picture" within which they are operating. Technological advances are a means not an end, and a means that changes rapidly while the end, i.e., sustainable business growth, remains timeless. As a guiding principle, an emphasis on the strategic focus ensures that digital content is offered within a coherent suite of courses at both undergraduate and graduate levels.

2) Use open-source software. Many schools struggle to manage the cost of digital content, both in terms of software / platform cost and as personnel cost. We noted a significant gap in advanced digital content between top tier and mid-tier schools. For any school to achieve efficiency in cost management, the most obvious recommendation is a movement toward open source software (e.g., R and Python). Although we recognize the obstacles to this movement (not the least of which is the lack of user-friendliness in R), the benefit of using R combines cost efficiency with the adherence to an emerging industry standard (and a standard that is firmly established in statistics and computational science).

3) Teach coding. Coding should be emphasized as a hands-on skill in marketing analytics courses, and where appropriate, courses focusing on digital marketing tools. The logic behind this recommendation is twofold. First, the basic conceptual framework of problem-solving via application of insights from data is made transparent in code. In this light, coding skills facilitate a deeper understanding of the problem and solution. Second, basic programming skills allow the worker to ask simple questions of data without relying on a separate data team. Put another way, basic coding skills permit the worker to "cross the last mile" to enter into corporate data, which is to say that worker coding skills enable them to navigate the company's internal data with immediacy, rather than waiting a week for an IT expert to provide the data to them.

4) Teach ethics. The ethics bucket is broader, complicated, and less easily codified than the digital marketing tools bucket or the marketing analytics bucket, and yet, it is arguably the most important. The ethics bucket embraces the key question of "what is the right thing to do?" as benchmarked by moral and legal considerations. The signature issue of the digital era is the privacy issue involving to which companies should have access to data that give profound insight into the lifestyles of ordinary people. Beyond the privacy issue, additional ethical questions issues involve how to find fault in mishaps involving autonomous digital agents (robots, self-driving vehicles, etc.) and how to manage employment in an era of increasing automation.

A related ethical concern is data integrity. We suggest that digital marketing and marketing analytics courses should include more attention to data and model transparency and integrity. Such teaching would touch on nomological validity, spurious correlation, cherry picking, and the like. Analysts and researchers should also be ready, willing, and able to explain their findings and recommendations in terms understandable to primary stakeholders.

From the broadest vantage point, it is clear that the value of the business school is that of an independent institution that provides fact-based input into other such institutions as government, business, and the military. Here, business schools may have internal faculty expertise, especially from psychologists with empirical expertise in moral psychology, but also from other units within the same university, such as departments of philosophy and religion. And yet, even with both the mandate and the expertise, ethics content remains sparse.

The recommendation is for schools to give greater prominence to the teaching of ethics and to situate moral issues in relation to a legal framework. Moreover, we see great value in the prospect of cross-disciplinary instruction, for example by partnering with philosophy departments, to deliver ethics content with depth.

VIII. Conclusion

The rapidity with which digital technologies have evolved in recent years demands new thinking on how best to train the new generation of managers in business schools around the world. A key challenge for marketing in particular is that the digital transformation in the advertising business model continues to accelerate, raising the specter of premature obsolescence of business school training should course content be overly specific to the needs of "today." Accordingly, this report takes a first step toward a "future-proof" curriculum plan by considering the current state of marketing course offerings by emphasizing general analytic and problem-solving skills.

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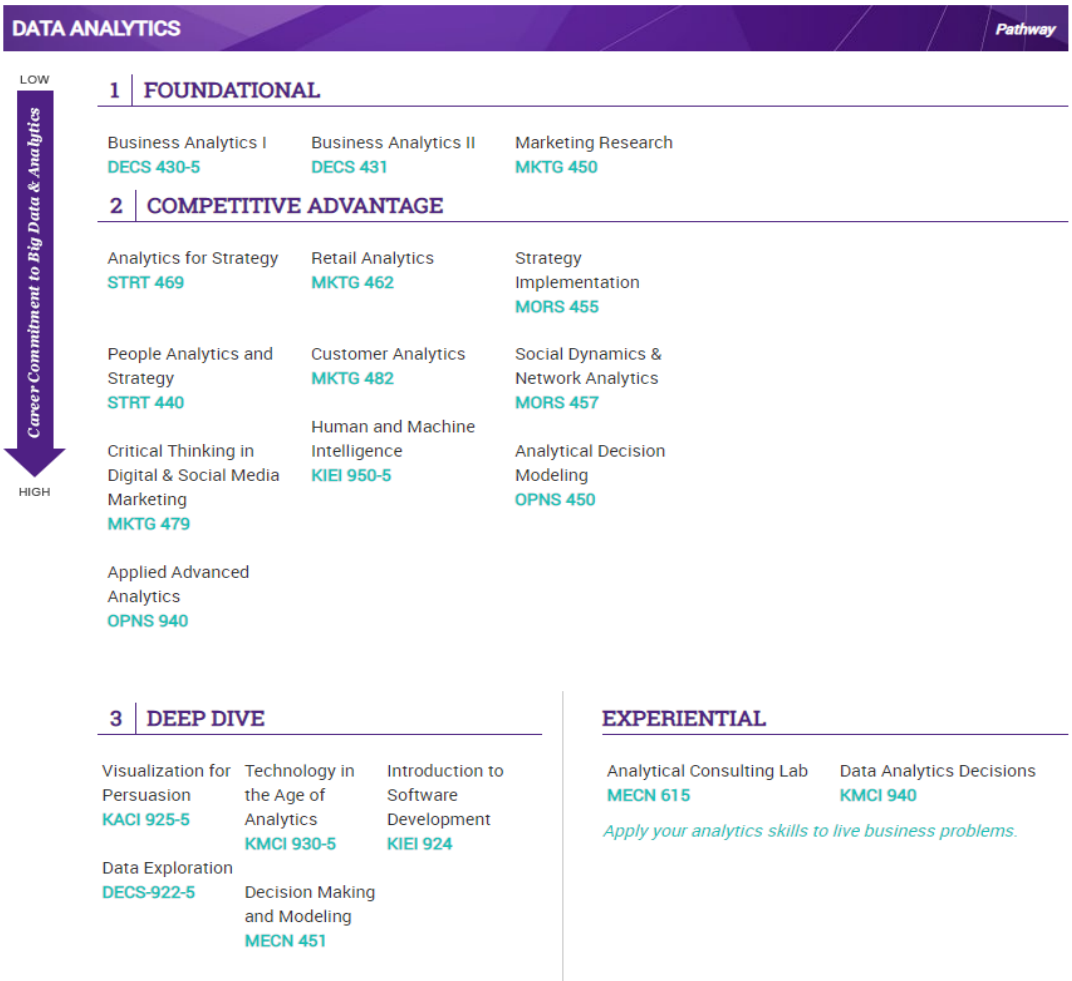
Appendix 1:
Digital course content in marketing at the Kellogg School of Management, Northwestern University

Spanning business school departments, the "Data Analytics Pathway" includes MBA courses at three levels of increasing specificity:
1) Foundational,
2) Competitive advantage, and
3) Deep dive.

Four marketing courses appear (acronym MKTG) within the data analytics pathway (see figure below); of these, 3 are representative of offerings in the digital content buckets discussed in this report:
a) digital marketing tools (MKTH 479 – Critical thinking in digital and social media marketing), and
b) marketing analytics (MKTG 462 – Retail analytics; MKTG 482 – Customer analytics).
The 4th marketing course in this pathway (MKTG 450 – Marketing research) does not have a digital focus.

Course descriptions appear after the figure below, reproduced from:
https://www.kellogg.northwestern.edu/data-analytics/academics.aspx



Key marketing courses with digital content:

MKTG 479 – Critical Thinking in Digital and Social Media Marketing
(example of course from digital marketing tools bucket)

Marketing in the modern digital landscape involves a number of challenges as platforms, technology, competitive landscapes, data availability, and analytics techniques evolve rapidly. This class prepares students to be effective marketing leaders in landscapes that involve digital and social media initiatives and equips them to make strategic decisions in rapidly evolving and data-rich environments. Students will gain a working knowledge of the digital marketing landscape, learn to critically assess strategic digital and social media plans, and evaluate a range of approaches and techniques for measurement of digital and social media data.

MKTG 462 – Retail Analytics and Pricing
(example of course from marketing analytics bucket)

This course will teach you how to use analytics and data to address decisions faced by retailers and manufacturers. Pricing and promotion decisions are emphasized, with additional coverage on topics such as private labels, product assortment, trade funding, shopper marketing, and more. The course is organized around a hierarchy of topics. We spend roughly one week understanding pricing and promoting to an individual customer. This analysis provides the foundation as we move to more aggregate decisions, such as setting regular and promoted prices at the product level, managing category pricing, and understanding the drivers of store traffic. As we progress through this hierarchy of decisions, we illustrate how different types of data can---or can't---be used to answer managerial questions. A key part of the class is understanding the limitations of different types of data and how better planning can both simplify the analytics and increase your confidence in the findings. This class is very practical and hands-on. Most of the data we analyze is from real-world managerial problems, through collaborations with leading retailers and consulting firms who have brought problem-driven challenges to the classroom. Weekly homework assignments, both individual and group, are paired with in-class cases. There is no final exam.

MKTG 482 – Customer Analytics and AI
(example of course from marketing analytics bucket)

Marketing is evolving from an art to a science. Many firms have extensive information about consumers' choices and how they react to marketing campaigns, but few firms have the expertise to intelligently act on such information. In this course, students will learn the scientific approach to marketing with hands-on use of technologies such as databases, analytics, machine learning, and computing systems to collect, analyze, and act on customer information. While students will employ quantitative methods in the course, the goal is not to produce experts in statistics; rather, students will gain the competency to interact with and manage a marketing analytics and AI team. We will use the statistics program R in Customer Analytics and AI. R is harder to use that Stata but has become the industry standard (together with Python) and is extremely good for data management, visualization, and Machine Learning. Before you start the course, you will need to learn how to use R using tutorials and online course. There will be an assignment that is due at the beginning of the first class to make sure that you are sufficiently proficient in R before the course starts. Please do not take this class if you are not willing or able to make this investment. The course consists of lectures, in-class exercises, group work, and case discussions. You will use R throughout the class to work with individual-level customer data. The course has no final; instead, students are evaluated on their performance on weekly assignments. This course has no overlap with other existing analytics or AI courses at Kellogg. The course is an excellent companion to Retail Analytics.

*Note: The “and AI” part of the course title was added in the last year.

Appendix 2 – List of schools surveyed

Undergraduate programs surveyed

1.	Arizona State University, Thunderbird School of Global Management	USA
2.	Case Western Reserve University, Weatherhead School of Management	USA
3.	Central Connecticut State University	USA
4.	Ecole de Management de Normandie	France
5.	George Mason University	USA
6.	Lahore University of Management Sciences	Pakistan
7.	Macquarie Business School	Australia
8.	Mannheim Business School	Germany
9.	Nanyang Technological University, Business School	Singapore
10.	National University of Singapore, NUS Business School	Singapore
11.	Newcastle University Business School	UK
12.	NYU Stern	USA
13.	Santa Clara University, Leavey School of Business	USA
14.	St. Joseph's University, Haub School of Business	USA
15.	SUNY Fredonia, School of Business	USA
16.	SUNY Brockport, School of Business and Management	USA
17.	Stevens Institute of Technology, School of Business	USA
18.	Texas Southern University	USA
19.	Townson University, College of Business and Economics	USA
20.	Universidad Ana G. Mendez - Gurabo, School of Business	Puerto Rico
21.	University of Dubai, Dubai Business School	Dubai
22.	University of Exeter, Business School	UK
23.	University of Hull	UK
24.	University of Louisville	USA
25.	University of Melbourne, Melbourne Business School	Australia
26.	University of Michigan, Stephen M. Ross School of Business	USA
27.	University of Pennsylvania Wharton	USA
28.	University of Queensland Business School	Australia
29.	University of Wollongong, Faculty of Business	Australia
30.	Yonsei University, School of Business	S. Korea
31.	Zayed University	United Arab Emirates

MBA programs surveyed

1.	Bocconi University, School of Management	Italy
2.	China Europe International Business School (CEIBS)	China
3.	Dartmouth College, Tuck School of Business	USA
4.	Duke University, Fuqua School of Business	USA
5.	Durham University	UK
6.	EDHEC Business School	France
7.	ESADE Business School	Spain
8.	George Mason University	USA
9.	Harvard Business School	USA
10.	HEC Paris Business School	France
11.	IMD, International Institute for Management Development	Switzerland
12.	Indian Institute of Management Ahmedabad	India
13.	Indian School of Business	India
14.	INSEAD Business School	France
15.	International University of Japan, Grad School of Intern Management	Japan
16.	Mannheim Business School	Germany
17.	Montclair State University, Feliciano Business School	USA
18.	Nanyang Technological University, Business School	Singapore
19.	National University of Singapore Business School	Singapore
20.	Newcastle University Business School	UK
21.	Northwestern University, Kellogg School of Management	USA
22.	NYU Stern	USA
23.	Rutgers University	USA

24. Santa Clara University, Leavey School of Business — USA
25. St. Joseph's University, Haub School of Business — USA
26. Stanford School of Business — USA
27. SUNY Brockport, School of Business and Management — USA
28. Stevens Institute of Technology, School of Business — USA
29. Sun Yat-sen Business School — China
30. Texas Southern University — USA
31. UC Berkeley, Haas School of Business — USA
32. UCLA Anderson School of Management — USA
33. University of Dubai, Dubai Business School — United Arab Emirates
34. University of Exeter, Business School — UK
35. University of Louisville — USA
36. University of Michigan, Stephen M. Ross School of Business — USA
37. University of Navarra, IESE Business School — Spain
38. University of Pennsylvania, Wharton School — USA
39. University of Pretoria, Gordon Institute of Business Science — South Africa
40. University of Queensland Business School — Australia
41. University of Wollongong, Faculty of Business — Australia
42. Yonsei University, School of Business — S. Korea

Masters programs surveyed

1. Arizona State University, Thunderbird School of Global Management — USA
2. Bocconi University, School of Management — Italy
3. Ecole de Management de Normandie — France
4. EDHEC Business School — France
5. EM Lyon Business School — France
6. ESADE Business School — Spain
7. HEC Paris Business School — France
8. ICHEC Brussels Management School — Belgium
9. Indian Institute of Management Ahmedabad — India
10. University of Jyväskylä, School of Business and Economics — Finland
11. Kuwait University, College of Business Administration — Kuwait
12. Macquarie Business School — Australia
13. Mahidol University, College of Management — Thailand
14. University of Melbourne, Melbourne Business School — Australia
15. Nanyang Technological University, Business School — Singapore
16. National University of Singapore, NUS Business School — Singapore
17. Newcastle University Business School — UK
18. Orebro University — Sweden
19. Rutgers University Business School — USA
20. Santa Clara University, Leavey School of Business — USA
21. Stevens Institute of Technology, School of Business — USA
22. Sun Yat-sen Business School — China
23. Townson University, College of Business and Economics — USA
24. University of Exeter, Business School — UK
25. University of Hull — UK
26. University of Navarra, IESE Business School — Spain
27. University of Queensland Business School — Australia