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Collaboration for Work: Assessing the Correlates of Three Types of Collaboration Perceptions that Alumni Associated with an MBA Capstone Course

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Combining a survey design with course records, across a nine-year period (2103 to 2021) we explored the factors that n = 167 MBA student alumni identified as helping them experience and practice business-oriented collaboration competencies during a client-oriented, team project-based, MBA capstone course. Alumni were asked questions about the influence of faculty contribution, client engagement, and project social purpose on their experience of collaboration. We used exploratory factor analysis to develop collaboration scales and regression analysis to assess variables affecting collaboration. The factor analysis suggested three simple, reliable, and distinct scales, each combining cohesiveness and productivity items, that capture three types of work-relevant collaboration – within team, between a team and the executive guiding the team, and between a team and its client. Open item analysis of alumni responses reinforced the validity of these three collaboration scales. Formal rater-based measures, lacking in prior research, of client engagement and project social purpose were created. Regression analysis indicated that, beyond demographic and program control variables, alumni experience of all three types of collaboration was enhanced by faculty contribution and client engagement but not by project social purpose. The results demonstrate the influence of capstone faculty and project clients in supporting MBA students' practice of collaboration competencies, while also contributing new short scales for measuring three types of collaboration. The article also describes a rich example of using practical, research-intensive strategic projects for client organizations to develop business-oriented competencies such as collaboration.

The goal of an effective MBA capstone course is to integrate the elements of the MBA into a practical set of competencies that prepare graduates "to think and implement decisions like a senior manager" (Kachra & Schnietz, 2008, p. 504). Many capstone courses are strong on the integration of concepts but weaker on delivering useful applications of the concepts to business problems and on the integration of concepts, skills and behaviors into competencies required of effective managers (Kachra & Schnietz, 2008). Upadhyay and Paul (2019) argued that combining knowledge management, organization-based projects and industry feedback leads to industry-ready business managers, and Rastogi, Sharma and Panse (2019) called out project-based learning as one of three main determinants of effective learning at the MBA level. Because they provide meaningful opportunities to develop, experience and practice both competencies and the application of concepts, experiential, team project-based capstones, often with actual clients, can be particularly effective for developing the competencies that employers demand (Cummings &Yur-Austin, 2022; LeMaire, Fisher & Watson, 2017; Nash, Hill, & Anthony, 2018; Roethlein, McCarthy Byrne, T., Visich, Li, & Gravier, 2021; Schaupp &Vitullo, 2020; Sroufe &Ramos, 2011).

In this paper, we focus on collaboration as a subset of business-ready competencies and explore the factors that alumni identified as helping them develop and practice business-oriented collaboration competencies during their MBA capstone course. Our motivation stems from the observation that, while project "coolness/appeal" or company brand often played a role in student interest during the client selection and matching process at the beginning of each class, student opinions about which projects were "the best" shifted as the teams worked on their own projects and compared project experiences across the five-to-eight clients served by each class. Factors cited in conversations and course evaluations included client engagement, the meaningfulness of projects, team productivity, opportunities to practice career-enhancing skills, and more.

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Our specific focus on collaboration grows out of both ad hoc student comments and literature that suggests that it is becoming an increasingly in-demand competency (Moldoveanu & Martin, 2008; Benishek & Lazzara, 2019). Further, collaboration as a competency falls under the more general competency category of Managing Human Capital or MHC, for which there is competency coverage "gap" in that incumbent managers assign greater importance to MHC than do MBA courses (Rubin & Dierdorff, 2009, p. 211). Given this, we ask whether and how collaboration competency can be developed in MBA courses, and draw on alumni experience of a long-running, client-oriented, team project-based, MBA capstone to parse out the factors that did (or did not) affect their practice of collaboration during the capstone.

Our choice of the capstone reflects its goal of providing students the opportunity to develop and refine in-demand managerial competencies by working on consequential strategic projects for client firms. The capstone is required for all full-time, part-time and online MBAs. During the capstone, teams of closely supervised students develop evidence-based solutions to strategic problems identified by client organizations. A typical class consists of one professor to provide structure and content; five to eight project teams, each with approximately five students; and for each group of students, a seasoned executive hired as an adjunct professor to serve as supervising project executive and coach for the team. A network of project executives has been built up over time, drawing initially from professor and business school contacts, and selecting over time the most motivated and effective project executives. Classes meet twice per week, once for a workshop for the entire class and once as project teams, including a project executive. The lead professor visits the teams in turn. Teams meet with clients weekly or bi-weekly for updates and three times for formal meetings – to launch the project, to discuss research insights and to make final recommendations.

Teams commonly commit to approximately 800 hours of research and analysis outside of class time. Deliverables include a research work plan, a research insights report and presentation, and a strategic recommendations report and presentation including an implementation plan and financial model. Over time, teams have completed more than 550 projects, including, in rough equal proportions, large corporations, high-technology start-ups and social ventures/nonprofits. To help defray the costs of the project executives and to ensure that the clients give the projects priority, clients are asked to pay a fee (on a sliding scale) and commit to approximately 30-40 hours of interaction over the course of the project.

Before each semester, faculty and administrative colleagues identify clients and pre-scoped projects prior to the start of each semester. Semester project choices are announced just before the semester starts, and student teams apply for projects, ranking each in order of preference and making the case for why their team was the best option for their first two choices. Student teams are matched to projects and project executives in time for the first class. Client-team matches are based on a mixture of preference and capacity, with the goal of maximizing team excitement and motivation for working on their project. Team-project executive matches are determined by project executives' interests and experience, as well as their track record working with different types of teams and projects.

Students are oriented to the consulting capstone's requirements six months and six weeks before the start of each semester, and student teams are formed before the semester so that they can begin to organize roles, responsibilities and norms. Within-team collaboration is emphasized in orientations to the capstone, during the pre-class selection and matching of teams, and in workshops and feedback sessions throughout the semester. The expectations for client-team and team-project executive collaboration are made equally explicit in conversations with clients and project executives, orientations, the syllabus, and throughout the class, but support was less formal. Client-team collaboration is further encouraged through a series of weekly meetings, each carefully prepared in advance under the guidance of the project executive. Team-project executive collaboration is further encouraged through modeling of collaborative work among project executives and faculty.

In the next section, we survey the literature on collaboration to refine the research question, identify variables that can affect collaboration, and develop hypotheses for testing. In the subsequent section, we describe the sample, survey, measures, and data analytic approach. This is followed by results and finally a discussion of study contributions, as well as limitations and opportunities for future research.

Literature Review

Collaboration Competency Development in the MBA Capstone

Client-oriented, team project-based, MBA capstones are a subset of problem-based learning courses and feature the added pressure and motivation of addressing a real business challenge for a client organization with a stake in the quality of the research and recommendations provided by the students (Cummings & Yur-Austin, 2022; Hill, Paris, Nash, & Blau, 2020). As such, they require collaboration with team members, as well as between the team and its client, and between the team and the professors leading the course or project. Collaboration refers to the cooperation between two or more parties in pursuit of shared goals (Frey Lohmeier, Lee, & Tollefson, 2006), and includes cooperation, coordination and integration of ideas and effort to achieve those shared goals (Bedwell, Fiore & Salas, 2014; Moldoveanu & Martin, 2008). Effective collaboration typically requires the elements of effective teamwork such as the setting of clear, shared goals; the recruiting of members with complementary skills and knowledge; the development of effective team processes including organizing, holding accountable and

resolving conflicts; and the nurturing of group cohesion (Kozlowski & Ilgen, 2006).

Client-oriented, team project-based, MBA capstones are built around a problem scope and deliverables that are clearly defined by the client organization and professor (Kloppenborg & Baucus, 2004); regular and closely supervised teamwork and interactions between the team and the client organization (Nikolova & Andersen, 2017); and written and oral deliverables that include research insights, recommendations, implementation plans and the financial implications of the recommendations (Cummings & Yur-Austin, 2022). By scoping/identifying a project that is too large and complex for collection of individuals to accomplish, that is by designing the project to require effective collaboration, a client-oriented, team project-based capstone course provides the opportunity to practice and develop a collaboration competency (Nash et al., 2018). Fisher, Hunter and Macrosson (1997) argued that when a collection of individuals needs to have cordial interpersonal relations, to be "well rounded" and is also expected to produce creative and innovative output, it should be considered as a team, and not just "a group."

But as important as opportunity and practice are, MBA students are more likely to develop a collaboration competency if they also receive explicit training and feedback in the building blocks of collaboration (Bedwell et al., 2014; Hobson, Strupeck, Griffin, Szoteck, & Rominger, 2014). The capstone course studied here built in such support in several ways: Faculty and project executives model collaboration behavior in their own interactions and in interactions with student teams; they also provide weekly feedback on collaboration behaviors. The course also includes workshops designed to build collaboration skills, such as preparing facilitation scripts for interaction with clients or bringing students through a "know, believe, do-not-know" process of articulating evidence developed individually and then integrating insights from evidence contributed by several team members (and sometimes the project executive). Finally, much of the research and analytic content of the course is inspired by the collaborative learning, design-thinking model championed by IDEO (Cummings & Yur-Austin, 2022).

Measuring Collaboration within Teams, with Coach/ Supervisors and with Clients

Consistent with theories of adult learning (Ambrose, Bridges, DiPetro, Lovett, & Norman, 2010; Kolb & Kolb, 2005), the MBA capstone course studied here was specifically designed to develop competencies such as collaboration by combining concrete experience (feeling) and active experimentation (doing) with instruction in the necessary concepts and skills (scaffolding). Existing scales for measuring MBA learning skills (e.g., Boyatzis Stubbs & Taylor, 2002) focus on skills and do not capture the combination of feeling and doing that is so important for adult learning; this suggests the need for the development of new collaboration competency scales.

Further, the actual implementation of client-oriented projects features three referents for collaboration: 1) with peers within a team, 2) with industry executives serving as project supervisors and project executives for projects, and 3) with representatives of client organizations. These three referents are an adaptation of the multi-stakeholder contingency approach advocated by Örtenblad and Koris (2014) in applying the learning organization to higher educational institutions, i.e., the employee perspective (MBA students), the managerial perspective (project executives), and the societal perspective (client representatives). In addition, while there are prior studies with measures of within-team dynamics and collaboration (e.g., Driskell, Driskell, Burke, & Salas, 2017; LeMaire et al., 2017; Roethlein et al., 2021; Stroufe & Ramos, 2011; 2015), there seemed to be no research that had attempted to simultaneously measure team-supervisor (project executive) collaboration and team-client collaboration, as well as within-team collaboration.

Finally, frequently used collaboration scales such as the 16-item Assessment of Interpersonal Team Collaboration Scale - AITCS (Orchard, Pederson, Read, Mahler & Laschinger, 2018) and the 17-item Collaboration Scale (Mâsse, Moser, Stokols, Taylor, Marcus, Morgan, Hall, Croyle & Trochim, 2008) would have led to an unwieldy survey had we used them for three referents. That is, using these scales across three referents would require 48 questions for the AITCS (3 referents x 16 items) or 51 for Collaboration (3 x 17 items) just to measure the collaboration variable. That said, we did model some of our questions on items within the Collaboration Scale (Mâsse et al., 2008, p. S155) that focused on conflict resolution/ getting along and productivity, two dimensions that the professors involved in the capstone identified anecdotally as elements of collaboration that were specifically needed in the client-oriented, team project-based, MBA capstone setting.

Taking into account these considerations, we start with an exploratory research question:

> RQ1. Can simple but reliable and valid scales be developed to measure the perceived quality of collaboration within teams, with clients and with project executives in a client-oriented, team project-based, MBA capstone setting?

Client engagement, Social Purpose and Professor Contribution: Variables that Affect Collaboration

Because it provides a rallying point and improves motivation, client engagement is important for successful project team collaboration (Cummings & Yur-Austin, 2022). In our experience, engaged clients value the project for its potential to help meet business goals, take the time to get to know the students and program, offer regular feedback and support over and above the minimum required by the course, and generally work with the team and project executive to ensure both a professional outcome for their organization and a good learning experience for the students. Kloppenborg and Baucus (2004, p. 617) noted that

one of the biggest problems in dealing with nonprofit agencies was a "lack of organizational support", and Nikolova and Andersen (2017: 758) went so far as to engage a "community engagement coordinator" whose job description included identifying "student-ready" projects and client organizations. Although identified as an important factor in project success (LeMaire et al., 2017; Sroufe & Ramos, 2011), no prior study has formally measured client engagement or its effects specifically on collaboration; we provide a measure of the quality of client engagement and test the effects of client engagement on collaboration across all three levels – within team, between team and project executives, and between team and client.

H1. Higher client engagement will be positively related to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients.

Shared goals have long been understood as being important influencer of effective collaboration within teams and between teams and leaders (e.g., Gully, Incalcaterra, Joshi, & Beaubien, 2002; Hu & Liden, 2011; Kozlowski & Ilgen, 2006). To the extent that social purpose increases interest in and passion for a project, social purpose projects may well enhance collaboration by providing a particularly emotionally charged set of shared and meaningful goals (Puchalska-Kamińska, Łądka-Barańska & Roczniewska, 2021). Indeed, there is a growing body of research that suggests social purpose helps attract, retain, and inspire more cooperation and productivity from employees who identify with and support the organization's purpose (Fairfax, Blau, & Hill, 2023; Henderson & Van den Steen, 2015). In part for this reason, Beusch (2014) has argued that higher education business schools need to integrate sustainability issues into their curricula, which Kenworthy-U'Ren (2003) and Sroufe and Ramos (2011) have done in their MBA courses. More specifically, previous research on client-oriented, team-based project courses have found that working with nonprofits motivates students – helping "needy clients" (Kloppenborg & Baucus, 2004, p. 611) – and/or helps to imbue students with "a greater sense of social responsibility" (Nikolova & Andersen, 2017, p. 751). However, formal measurement of project social purpose has not been done in prior studies. Combining these indications, we posit that project social purpose will enhance collaboration at all levels by providing a more compelling goal to work towards.

H2. Project social purpose will be positively related to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients.

The professor's contribution to team-based projects is a third relevant variable because of the professor's role promoting and enabling effective collaboration within teams, with project executives and with clients. Course professors in client-oriented, team project-based, MBA capstone courses ideally play a very hands-on, facilitative role (LeMaire et al., 2017; Sroufe & Ramos, 2011), "creating a learning environment, encouraging critical evaluation of ideas, and providing essential resources" (Kloppenborg & Baucas, 2004, p. 613). Similarly, these professors help student project teams stay on track by assessing students' work quality, serving as a liaison between students and outside stakeholders, and providing an encouraging environment for students' project management skill development (Cummings & Yur-Austin, 2022). Nikolova and Andersen (2017) noted the different roles the academic supervisor (professor) plays in a client-oriented, team project-based course including: helping to determine project scope, teaching of best practices in consulting, answering project methodology questions, and monitoring the project and client-team relationship throughout the semester giving both formal and informal feedback. Such prior research suggests that the professor's facilitation of a client-oriented, team project-based, MBA capstone course will have an influence on effective collaboration within teams, with project executives and with clients.

H3. Higher professor contribution will be positively related to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients.

Alternative Explanations – Demographic and Program-Context Variables

To provide stronger evidence for our focal variable relationships, it is important to rule out alternative explanations by controlling for more distal variables (Spector, 2021); further, controlling for such variables provides a stronger test of the relationship between the collaboration scales and client engagement, social purpose, and professor contribution measures.

Demographics (e.g., gender, race, years of professional experience) constitute a set of variables that might well affect collaboration. For example, Bell, Villado, Lukasik, Belau, and Briggs (2011) reported that gender and race were negatively related to team cohesion and performance. Harrison, Price, Gavin and Florey (2002) found a similar, negative gender and race relationship to team social integration, including cohesiveness, for graduate and undergraduate students working on team projects. Finally, anecdotal experience with professional MBA students who bring years of experience to the class suggests that years of professional experience may contributes to individuals' contribution to team cohesion and effectiveness (in a different context, see Temkin-Greener, Gross, Kunitz, & Mukamel, 2004).

Another set of potentially relevant variables relate to the program-related context (e.g., years since taking course, delivery modality). For example, Olson and Olson (2012) found that virtual teams can struggle to find a "common ground" needed to develop the trust that is essential for remote collaboration, leading us to wonder whether collaboration would suffer in an online teaching

environment. As for years since taking the course, our concern is simply that any course effects are likely to wane over time – in reality and/or in memory (Blau, Hill & Cannon, 2023).

Taking these findings together, we posit that:

H4. Higher client engagement will contribute significantly to explaining variance related to perceptions of the quality of collaboration within teams, with project executives/ supervisors and with clients – over and above the effects of demographic and program variables.

H5. Higher project social purpose will contribute significantly to explaining variance related to perceptions of the quality of collaboration within teams, with project executives/ supervisors and with clients – over and above the effects of demographic and program variables.

H6. Higher professor contribution will contribute significantly to explaining variance related to perceptions of the quality of collaboration within teams, with project executives/ supervisors and with clients – over and above the effects of demographic and program variables, client engagement, and social purpose.

Method

Sample and Survey

The sample consisted of students in the global (full-time), online and professional (part-time) MBA programs of a public university in the Mid-Atlantic region of the United States. Data for this study were collected in two ways: a survey of alumni of the MBA capstone course and ratings of various course, client and project elements as judged by three professors who had taught the course during the study period. The University Institutional Research Board determined that the study did not need its approval (14 July 2021 letter).

The survey included informed consent and a promise of confidentiality; most respondents self-identified allowing the raters to evaluate section- and project-specific variables (e.g., course delivery modality or client engagement). The survey was designed in Qualtrics and sent to 1283 students who had taken the capstone during a nine-year period, from 2013 to 2021. This included 706 professional (part-time) MBA students, 369 full-time and 208 online (although a number of the full and part-time MBA students attended online due to COVID). During November and December 2021, multiple targeted emails were sent to a mixture of personal, work and university email addresses, resulting in 283 respondents to the survey, for an initial response rate of 22.1% (283/1283). While approximately 95% filled out some portion of the survey, unfortunately 116 of 283 (41%) did not fill out enough of the survey to allow data analyses for testing the research questions. Closer analysis of the raw data indicates that after filling out a little information, i.e., name, type of MBA program, graduation (month/year), the majority of missing respondents stopped when asked an open-ended response item that was inserted between the background data and the collaboration scales.

In the end, the sample size n was 167 for a 13% (167/1283) response rate. Ninety-eight percent of the respondents were currently employed and the percentages reported in Table 1 for gender, race and MBA program type were consistent with the course alumni population.

Variables and Measures

The survey measures of collaboration, and professor contribution, as well as the rater-generated measures of client engagement and social purpose, were informed by the literature and created based on the collective experiences of key faculty leading the capstone course from 2013 to 2021, the time period sampled.

Collaboration. The items included in the survey to measure collaboration were informed by adult education focus on feeling and doing (Kolb & Kolb, 2005); the recognition that the client-oriented, team project-based, MBA capstone course involved multiple stakeholders (Örtenblad & Koris, 2014; Sroufe & Ramos, 2015) and so multiple collaboration partners; and a previous inductive study of the competencies employers look for when hiring MBAs (Nash, Hill & Anthony, 2018). Specifically, Nash

Table 1

Sample Frequencies and Percentages - Nominal Demographic and Ordinal Rated Variables

Variable	(n = 167)
Gender	
Male	n = 106 (64%)
Female	n = 54 (32%)
Non-binary	n = 3 (2%)
Prefer not to say	n = 3 (2%)
Race	
White	n = 119 (71%)
Black or African American	n = 15 (9%)
American Indian/Alaska Native	n = 1 (1%)
Asian	n = 22 (13%)
Native Hawaiian/Pacific Islander	n = 0 (NA)
Hispanic	n = 7 (4%)
Other/Prefer not to say	n = 3 (2%)
Modality	
Online	n = 56 (34%)
In-person	n = 111 (66%)
MBA Program Type	
Global	n = 40 (24%)
Part-time	n = 101 (61%)
Online	n = 16 (10%)
Other (e.g., Full-time, Executive)	n = 9 (5%)
Type of Organization	
Profit	n = 78 (47%)
Non-profit	n = 68 (41%)
Government	n = 21 (12%)
Client Engagement (rated)	
Lower	n = 47 (28%)
Higher	n = 119 (72%)
	n = 1 (missing)
Project Social Purpose (rated)	
No	n = 123 (74%)
Yes	n = 43 (26%)
	n = 1 (missing)

and colleagues reported on an ongoing assessment of graduating students using open-ended questions to inquire about what, if anything, from the capstone the students had learned, applied at work and/or found useful for career progression. A central finding from the feedback related to collaboration within teams and across personalities, backgrounds and knowledge bases to produce professional grade research and recommendations for clients. Another central finding was the importance of building effective working relationships with the clients and project executives to the projects. To develop the collaboration items tested in this study, we combined these anecdotal findings with previous research on scales for measuring collaboration (especially Mâsse et al., 2008).

The items asked for in the survey are listed in Table 2, below. They were structured in Qualtrics using a 10-point "slider" response scale from 1 = not at all to 10 = extremely, with a "not applicable" option coded as missing. We used a "slider" scale because research has shown that sliders capture more precise and reliable information than conventional Likert type scales (Chyung, Swanson, Roberts, & Hankinson, 2018). To augment the slider-scale response items, the survey included one open-response item: "Thinking back, what competencies, skills, and/or concepts did you develop or reinforce during the MBA capstone experience?"

Client engagement and social purpose. The three full-time faculty who consistently taught the capstone over the time studied coded each project for client engagement and social purpose. For both ratings, criteria were established by the raters prior to coding; the raters coded each project independently, based on memory plus records stored in the learning management software, email archives and the client engagement software. The coders' interpretation of the data and their memories were enhanced by the hands-on nature of the course: Faculty met and interacted with all clients at multiple points before, during and after each project; faculty observed team-client interactions several times during each course, often accompanying teams on site visits and/or in conversations; and faculty also conducted weekly conversations among project executives that included detailed conversation about client-team interactions and the nature of the project. Further, in most cases, two faculty had discussed the project with the client during the process of securing and/or debriefing the project. Finally, the raters met several times to compare their codes and to discuss and resolve all differences. It is also important to point out that prior research had not formally created rater-based client engagement and social purpose measures.

The one-item client engagement variable was recorded as 1/lower, when clients attended the three formal meetings specified in the syllabus and contract (introductory, research insights, final recommendations) and perhaps answered additional specific questions but were not otherwise involved in the project. Client engagement was recorded as 2/higher when clients engaged in weekly team-client discussions and were otherwise more responsive and involved with the student team. For example, highly engaged clients invited students to tour their facilities and meet staff not directly involved with the project; held weekly conference calls with teams to discuss findings to date, to offer further context and encouragement, and to brainstorm next steps, alternative explanations, etc.; made an extra effort to provide access to customers, employees, and data; coached the team concerning internal politics; and/or offered mentorship to some or all team members.

The one-item project social purpose variable was recorded as 1/no and 2/yes. Social purpose was judged as yes if the project, not necessarily the organization, was meant to serve the greater good (Weerawardena, Salunke, Haigh, & Mort, 2021). For example, a university-based project concerning the university's management of its endowment or an assessment of the viability of a new school would be coded as 1/no social purpose because the projects was about the improvement of the business of higher education – whereas a university-based program focused on developing a program to reduce violence in the community would be rated as 1/yes social purpose. Similarly, a project focused on a for-profit company's product designed to mitigate climate change would be coded as 2/yes social purpose, while the design of a fundraising strategy for a non-profit hospital would be coded 1/no social purpose even though the overall mission of the hospital has a clear social purpose.

Professor contribution. This was measured by one item drawn from the survey question, "In addition to your project executive, how much did your professor contribute to your team's overall learning?" This item was also measured using the slider response scale from 0 (not at all) to 10 (extremely), with a not applicable option.

Control variables. Three demographic variables were measured on the survey: Gender, Race, and Years of professional experience. Gender response options were 1 = male, 2 = female, 3 = non-binary, 4 = prefer not to say, 5 = other (fill in). Race response options were 1 = White, 2 = Black or African American, 3 = American Indian or Alaska Native, 4 = Asian, 5 = Native Hawaiian or Pacific Islander, 6 = Hispanic, 7 = other/prefer not to say. Years of professional experience was measured by one item "How many years of professional experience have you had?", answered on a sliding scale.

Four contextual variables were measured: Modality, MBA program type, Years since taking course, and Type of organization. Modality was measured as 1 = online, 2 = in-person, using records of when the respondent took the course. MBA program type was used to capture any potential non-modality-related program differences; it was self-reported and coded as 1 = Global (full-time) MBA, 2 = Part-time MBA, 3 = Online MBA, and 4 = Other, e.g., an earlier version of the full-time MBA. In most cases, it was possible to use course enrollment records to confirm the self-reported data on these variables. Type of organization was rater coded as 1 = profit, 2 = non-profit, 3 = government, using respondent-identified client organization names plus course records recorded in email archives

and a customer relationship software system. Given the MBA emphasis on for-profit organizations, this variable was used to capture potential differences in motivation, cohesion and so collaboration related to working on projects for for-profit versus not-for-profit entities. Finally, Years since taking the course was based on self-reported graduation date, verified by academic records. The project data was coded as 2013 = 9, 2014 = 8, 2015 = 7, 2016 = 6, 2017 = 5, 2018 = 4, 2019 = 3, 2020 = 2, 2021 = 1. While there were subtle changes in course content – e.g., readings and examples and workshops, the basic structure of the client-oriented, team project-based consulting course did not change during this period.

Data Analysis

Frequency analyses were conducted first, followed by exploratory factor analysis (EFA) to reduce the seven team collaboration items into distinct scales (Hinkin, 1995) both to test RQ1 and to use in subsequent tests of the hypotheses. Two of the authors compiled and coded collaboration-related comments from the free text responses to the prompt: "Thinking back, what competencies, skills, and/or concepts did you develop or reinforce during the capstone experience?", discussing and resolving differences in interpretation as they arose. This open item analysis was done to aid the interpretation of the EFA scales and to add further context and insight into what the course alumni mean when talking about what they learned about collaboration during the course.

Means, standard deviations, and correlations were then calculated for continuous variables, and independent samples t-tests were used for an initial test of H1, whether higher Client engagement was related to higher perceived degree of collaboration, and H2, whether Social purpose was related to higher perceived degree of collaboration.

Prior to running correlations between variables, independent sample t-tests were conducted using a median split on Years since taking course to check the impact of time on the means of key study variables. Correlations were then used to further test RQ1 as well as to perform an initial test of H3 concerning professor contribution. Hierarchical regression analyses were then used to test H4, H5 and H6, testing the association between each type of Collaboration and Client engagement, Social purpose and Professor contribution– over and above the influence of demographic and contextual control variables. SPSS (2021) was used for all data analyses, and findings at a $p < .05$ or $p < .01$ value (two-tailed) are reported as statistically "significant". To enhance interpretability of the data, changes in R2 and adjusted R2 are reported.

Results

Table 1 reports the frequencies and percentages for nominal demographic and project background variables and for ordinal client engagement and social purpose variables. It shows that the majority of respondents were male (64%) and white (71%); enrolled in the in-person (66%), part-time MBA program (61%); employed by for-profit organizations (47%); and involved in non-social purpose projects (74%) with higher client engagement (72%).

Collaboration: Three Factors Plus Open-item Responses

To develop a collaboration scale and test RQ1, we used exploratory factor analysis (EFA) and, to improve interpretability, qualitative analysis of the responses to the open item in the survey.

EFA. Table 2 presents the results of the EFA that reduced the seven items related to perceptions of collaboration into three scales. Following recommended procedures (Costello & Osborne, 2005), the following criteria were used: principal components method; scree test, and oblique rotation (direct oblimin, Delta = 0) since factors were expected to be correlated. With oblique rotation, the

Table 2

Exploratory Factor Analysis for Seven Team-related Items Using a Three-factor Extraction and Oblique Rotation

	1[b]	2[b]	3[b]
1. How well did your team get along with your client?	-.03	.15	**-.88**
2. How helpful was your client in providing the clarity and informatio needed for a successful project?	.06	-.09	**-.95**
3. How well did your team get along with each other?	.01	**.97**	.05
4. How productive was your team in doing the work required?	.07	**.78**	-.22
5. How well did your team get along with your Project Executive?	**.75**	.27	-.01
6. How much did your Project Executive contribute to your team's overall learning?	**.96**	.04	.05
7. How much did your Project Executive contribute to your team's client management?	**.90**	-.16	-.08
N =158. Oblique rotation. Pattern matrix reported			
Initial Eigenvalues[b]	4.05	1.17	.81
Percentage of variance accounted for	58%	17%	12%

Note. [a] Responses using a sliding 10-point scale: 1 = not at all to 10 = extremely; [b] Factor 1 = Project Executive-team Collaboration – 3 Items, #5, 6, 7; [b] Factor 2 = Internal-team Collaboration – 2 items, # 3, 4; [b] Factor 3 = Client-team Collaboration– 2 items, #1, 2; *factor loadings above **.50 bolded**

pattern matrix is reported for factor/item loadings. The sample to items ratio is 22:1 (158/7) which exceeds the recommended 10:1 ratio. There were no double item loading complications (cross factor loadings of at least .50), so all items were retained. Indeed, the strength of the item loadings gives more confidence in the reliability of this factor solution (Beavers, Lounsbury, Richards, Huck, Skolits, & Esquivel, 2013). As shown in Table 2, the eigenvalue for factor 3 is less than 1 (.81), and 1 is a common cut-off for deciding which eigenvalues to use. However, Costello and Osborne (2005, p.2) noted that "there is broad consensus in the literature that an eigenvalue of 1 is among the least accurate methods for selecting the number of factors to retain," and they recommended using the scree test to indicate the number of factors. Following these guidelines, we used the scree test to identify three factors.

Based on item interpretation recommendations (Costello & Osborne, 2005), Factor 1 was named Project executive-team collaboration and consisted of three items (#5, 6 and 7). These three items were summed to form the Project executive-team collaboration scale; the coefficient alpha reliability estimate for this scale was .88. Factor 2 was named Internal team collaboration and consisted of two items (#3 and 4). These two items were summed to form the Internal team collaboration scale, with a reliability estimate of .85. Factor 3 was named Client-team collaboration and consisted of two items (#1 and 2). These two items were summed to form the Client-team collaboration scale, with a reliability estimate of .85. The reliability of all three scales is above the recommended alpha reliability threshold of .70 (Hinkin, 1995). Finally, to facilitate further analysis, for each scale the item sum was divided by the number of items in that scale so that the 10 -point response scale was retained.

Open item analysis. Table 3 presents the collaboration-related comments from the free-text item. The comments are sorted by level of collaboration (within-team, team-client and team-project executives) and, for each level, grouped under four themes: Collaborative work & coordination; Team dynamics, trust & accountability, Team leadership & communication, and Relationship-management & communication. Not all quotes are positive, lending more credibility to these responses. Where a number is given in parenthesis after a quote it represents the number of responses that included that quotation, for example, under within-team collaboration, within the Team leadership & communication theme, "team work/ working in teams" (20), means that this quotation was mentioned by 20 alumni.

The sheer number of the free-text comments related to collaboration provides face validity for the importance of collaboration-related skills as a managerial competency (Rubin & Dierdorff, 2009) that alumni recognize as being relevant (Nash, Hill & Anthony, 2018); also the fact that alumni commented on collaboration at all three levels is consistent with the three scales derived through EFA.

Clearly, the alumni commented most often on topics related to collaboration in the within-team context. Their comments reinforce the finding that alumni perceive collaboration-related skills as being learned and/or reinforced within in the capstone course. Further, the three themes – Collaborative work and coordination; Team dynamics and accountability, and Team leadership and communication – correspond with dimensions of collaboration noted in literature: Functional collaboration, coordination of activities, importance of attention to team dynamics, and the role of leadership efforts (Bedwell et al., 2014; Kozlowski & Ilgen, 2006; Moldoveanu & Martin, 2008).

Although the alumni commented less often on topics related to collaboration with clients and project executives, their comments – e.g., about the clients being "heavy hitters" that took careful management or even their disappointment when collaboration faltered with an executive advisor – indicated that they took these levels of collaboration quite seriously. As in the within-team context, there were many comments that could be grouped under the Collaborative work and coordination theme, however, at the team-client and team-project executive collaboration levels, there were no comments that fell under the Team dynamics, trust & accountability, and the idea of team leadership and communication at the team level transformed into Relationship management and communication. These differences in themes reflect the power difference in the types of collaboration – with power more or less equal in the within-team setting but stratified in the team-client and team-executive settings, with clients and project executives having more power. The differences also have implications for the complexity of the facilitation of collaboration required of both the students and professors engaged in client-oriented, team project-based, MBA capstone courses.

Finally, the combination of the EFA and the qualitative analysis of the open-item responses concerning collaboration support the RQ1, that it is possible to construct simple, reliable and valid scales for measuring the perceived quality of collaboration within teams, between teams and clients, and between teams and project executives.

Testing the Relationships of Higher Client Engagement and Social Purpose to Team-Related Collaboration Perceptions

To test H1 concerning the relationship between client engagement and collaboration within teams, with project executives and with clients, we conducted independent sample t-test results (one-tailed, since direction was specified a priori) for lower versus higher Client engagement (CE) on each collaboration scale. The t-test results showed the following significant differences in means (M): for Client-Team Collaboration, the lower CE M of 6.91 was significantly different from the higher CE M of 7.90, with $t(158) = -2.69$, $p < .01$; for Internal Team Collaboration, lower CE, $M = 7.34$ differed from higher CE, $M = 8.03$ with $t(158) = -1.82$, $p < .05$; for Project Executive-Team Collaboration, lower CE, $M = 6.03$ differed from higher CE, $M = 7.21$ with $t(158) = -2.78$, $p < .01$. Overall, these results provide support for H1: Higher client engagement is positively related to perceptions of the

Table 3

Collaboration-related Open Item Quotes in Response to the Prompt - "Thinking back, what competencies, skills, and/or concepts did you develop or reinforce during the MBA capstone experience?"

Within-Team Collaboration		**Team-Client Collaboration**	**Team-Project Executive Collaboration**
Collaborative work & coordination	*Team dynamics, trust & accountability*	*Collaborative work & coordination*	*Collaborative work & coordination*
"collaboration" (10)	"I needed to become comfortable trusting my team"	"client management collaboration" (2)	"our project advisor was instrumental in guiding us"
"group collaboration, learning how to bring everyone's strengths to the project" (2)	"learning that trust is the key to a good team, which was quickly developed & allowed us to effectively collaborate with no wasted time"	"working with clients" (2)	"learning to make sure our work is sound & analyze your work & assumptions from the perspective of our advisor who is looking to critique them"
"collaborating across different skillsets of team members"	"working on intra-team dynamics"	"our clients were heavy hitters in the business world, we had to navigate making them happy but also at times disagreeing with them"	"managing client/advisor expectations"
"working with people across functions & skill types"	"team dynamic skills: uncomfortable conversations about people not doing their work"	"adjusting based on customer needs & feedback"	*Relationship management & communication*
"ability to work as a group & find a way to contribute amongst dynamic & bright personalities"	"you had to support each other but hold each other accountable to deliver"	"interfacing with clients, establishing goals & deliverables with clients"	"people management – managing the personalities of the team, project executive, the client was challenging; it took a lot of focus to pull everyone together & align objectives & direction"
"working in a collaborative space, dealing with conflicting views"	"team work/working in teams" (20)	"client interaction team work"	"I was able to communicate better with our project coach"
"collaboration – I learned to work with other competitive & highly driven people to overcome challenges effectively in a team environment"	"working with different personality types"	"I learned to work in a team & with a client that was unknown to us"	"we had very contentious relationship with our mentor/project executive, who would put us down, over work us, not provide valuable feedback"
"refine collaboration skills even with people you might not agree with or like"	"conflict resolution" (2)	*Relationship management & communication*	
"working in a team in a busy environment"	"managing conflict" (2)	"client relationship management" (9)	
"cross-functional teamwork"	"de-escalating team conflict"	"client relations" (2)	
"holding team members accountable for their contributions"	"dynamic team challenges, but a good experience to work through"	"building a relationship with a client"	
"team workflow management"	*Team leadership & communication*	"client communication"	
"collaborative sessions to help us iron out our interpretation & deliver the most concise findings & clear action steps possible"	"leadership was always in the forefront of producing deliverables as group dynamics played out"	"how to interact with third party clients"	
"leaning on each group member's strengths to ensure the best end product"	"it reinforced my ability to help group members come to a consensus & create cohesion within our capstone group"	"the interactions with my client & the sponsors was not great"	
"supporting the training & upskilling of other team members"	"people management; relationship management" (2)		
"working with a team to execute within constraints"	"team management skills" (2)		
"delegating, checking in & correcting issues when teams stray from the path"	"working with & leading a team"		
	"communicate better with my peers, meeting with them frequently allowed me to talk over any problems that were occurring in the project"		
	"effective internal team communication"		

quality of collaboration within teams, with project executives/supervisors and with clients.

To test H2 concerning the relationship between project social purpose and collaboration within teams, with project executives and with clients, we again conducted independent sample t-tests (one-tailed) concerning the relationship between no versus yes Social purpose (SP) and the means (M) of each of the team collaboration scales. For Client-team collaboration, the results were that no SP, M = 7.63 was not significantly different from yes SP, M = 7.68 with t(156) = -.15, p = .44. Similarly, for Internal team collaboration, no SP, M = 7.86 did not differ from yes SP, M = 7.80, t(156) = .16, p = .43, and for Project executive-team collaboration, no SP, M = 6.97 did not differ from yes SP, M = 6.70, t(156) = .62, p = .27. These results provide no support for H2: Social purpose was not positively related to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients.

Means, Standard Deviations, and Correlations of Continuous Variables

An examination of the means, standard deviations and correlations of the study's continuous variables is shown in Table 4.

. Students' average years of professional experience was nearly 14, and the bulk of the respondents had finished the course between 2 and 7 years before the survey. As a partial test of response bias, we compared the means for Years since taking the course between the completed versus not completed surveys and found no difference between the mean for the complete sample, M 4.65 (n=147), SD = 2.35, and the mean for the incomplete sample, M 4.44 (n = 64), SD = 2.24, t-test of difference between means, t(209) = .61, p = .55. In addition, to partially test for the impact of time on continuous study variables, a median split was done between those respondents who had taken the course 1 to 4 years ago (later takers) versus 5 to 9 years ago (earlier takers), to create independent samples. This then allowed for independent sample t-tests to be conducted on all continuous variables, i.e., Years of professional experience, Client-team collaboration, Internal-team collaboration, Project executive-team collaboration, and Professor contribution. The results for all variables were not significant. That is, there were no significant mean variable differences between earlier takers versus later takers, giving us more confidence that the time between taking the course and responding had less effect on the findings reported.

Although the mean of all three collaboration scales is relatively high – Client-team collaboration (M =7.64), Internal team collaboration (M =7.82), and Project executive-team collaboration (M = 6.94) – the results for Project executive-team collaboration are significantly lower than those for Client-team and Internal team collaboration. Client-team collaboration is higher than Project executive-team collaboration, t(157) = 4.45, p < .01 (two-tailed) and Internal team collaboration, higher than Project executive-team collaboration, t(157) = 4.98, p < .01 (two-tailed). These significant differences in the scales' means add additional support to the factor analysis showing all three scales were distinct.

Turning to the correlation results, the collaboration scales are related but sufficiently distinct from each other to support further analysis (Stevens, 1996); the strongest correlation is between Client-team collaboration and Project executive-team collaboration, r(145) = (.59)2 or a 35% overlap. There are statistically significant differences between the collaboration-related correlations. For example, both Client-team collaboration and Project executive-

Table 4

Means, Standard Deviations and Correlations of Continuous Study Variables

Variable Name	M	SD	1	2	3	4	5	6
1. Years of Professional Experience[a]	13.67	7.18	(NA)[d]					
2. Years Since Taking Course[b]	4.65	2.35	.03	(NA)				
3. Client-team Collaboration[c]	7.64[e]	2.08	.09	.01	(.85)			
4. Internal-team Collaboration[c]	7.82[e]	2.42	.14	-.02	.51**	(.85)		
5. Project Executive Team Collaboration[c]	6.94[e]	2.35	.06	.08	.59**	.47**	(.88)	
6. Professor Contribution	6.48[c]	2.83	-.01	-.04	.41**[f]	.25**[g]	.50**[f]	(NA)

Note. N = 147. * $p < .05$; ** $p < .01$ (both two-tailed); [a] Years of Professional Experience – number of years; [b] Year Since Taking Course, 1 = 2021, 2 = 2020, 3 = 2019, 4 = 2018, 5 = 2017, 6 = 2016, 7 = 2015, 8 = 2014, 9 = 2013; [c] Client-team Collaboration, Internal -Team Collaboration, Project-exec Collaboration, Professor Contribution; 0 = not at all to 10 = extremely; [d] coefficient alpha reliabilities in diagonal, NA = not applicable; [e] significant difference in Means: Client-Team Collaboration higher than Project Executive-team Collaboration, $t(157) = 4.45$, $p < .01$ (two-tailed); Internal-Team Collaboration higher than Project Executive-Team Collaboration, $t(157) = 4.98$, $p < .01$ (two-tailed); [fg] significant difference between Client-Team Collaboration – Professor Contribution ($r = .41$) and Internal Team Collaboration – Professor Contribution ($r = .25$); $t(144) = 2.13$, $p < .05$ (two-tailed); [fg] significant difference between Project Executive Team Collaboration – Professor Contribution ($r = .50$) and Internal Team Collaboration – Professor Contribution ($r = .25$), $t(144) = 3.36$, $p < .01$ (two-tailed); [ff] there is no significant correlation difference between Project Executive Team Collaboration – Professor Contribution (r = .50) versus Client-Team Collaboration – Professor Contribution (r = .41), $t(144) = 1.40$, p = .17

team collaboration show significantly stronger relationships to Professor contribution than does Internal team collaboration to Professor contribution. That is, the Client -team collaboration-Professor contribution correlation (r = .41) is significantly higher than the Internal team collaboration-Professor contribution correlation (r = .25) with t (144) = 2.13, p < .05 (two-tailed). Similarly, the Project executive-team collaboration-Professor contribution (r = .50) is significantly higher than Internal team collaboration- Professor contribution (r = .25), t(144) = 3.36, p < .01 (two-tailed). These differential correlational relationships provide additional support for the distinctiveness of the three collaboration scales, and so for RQ1. Further, the positive and significant correlation between Professor contribution and the three collaboration scales provides initial support for H3, concerning the professor contribution to perceived quality of collaboration within teams and between teams and project executives and clients.

Hierarchical Regression Results

To explore the six hypotheses more fully, hierarchical regression analysis was performed. To run the hierarchical regression analysis, several variables needed to be recoded due to low sample sizes for within variable categories (Stevens, 1996). Race was recoded into 1 = white, 2 = non-white (combining all other races); MBA program type was recoded into 1 = part-time, 2 = other (global, online, other); Type of organization was relabeled as Profit/non-profit with 1 = profit and 2 = non-profit (non-profit, government). One outlier was deleted from all three models because of a standardized residual over 3.0 (Stevens, 1996).

For each collaboration scale, there was four-step hierarchical regression model, with step 1 including the demographic variables, step 2 adding the contextual variables, step 3 adding the client engagement and social purpose variables, and step 4 adding the professor contribution variable. Table 5 reports the final results, including the change of variance explained (R2) with each step, as well as the overall (R2), and adjusted variance (adjusted R2) for the entire model. The F values for each step and for the overall model are reported below. The final results explained 25% of the variance, 19% when adjusted for shrinkage, for the Client-team collaboration scale; 21% or an adjusted 15% of the variance for the Internal team collaboration scale; and 30% or an adjusted 25% of the variance for the Project executive-team collaboration scale. Below we summarize our findings, organized by variable steps.

Starting with the Client-team collaboration scale, three demographic variables were first entered,, Gender, Race and Years of professional experience. Collectively the demographic variables did not explain significant variance for any of the models. For Client-team collaboration, R2 = .04, with an overall F(3, 137) = 1.86, p = .14; for Internal team collaboration, R2 = .05, with an overall F(3, 141) = 2.57, p = .06; and for Project executive-team collaboration, R2 = .02, with an overall F(3, 137) = .93, p = .43. In this step, none of the coefficients for any of the demographic variables were significant.

In the second step, four contextual variables were entered: Modality, MBA program type, Profit/non-Profit, and Years since taking course. Collectively these variables did not explain additional variance for two of the models. For Client-team collaboration, change R2 = .03, with an overall F(7, 133) = 1.45, p = .19; and for Project executive-team collaboration, change R2 = .02, with an overall F(7, 133) = .75, p = .62. However, for Internal team collaboration, these variables did explain additional variance: change R2 = .09, with an overall F(7, 137) = 3.15, p < .01. In particular, both Modality, b = -.69, t (143) = -2.02, p < .05; and MBA program type, b = -1.16, t(143) = -3.42, p < .01 show a negative and significant effect on perceptions of the quality of Internal team collaboration. Interestingly, these findings suggest that the more full-time, in-person cohorts struggled with within-team collaboration.

In the third step, Client engagement and Social purpose were added, and together these variables accounted for additional significant variance in two models: For Client-team collaboration, change R2= .06, with an overall F(9, 131) = 2.18, p < .05; and for Project executive-team collaboration, change R2 = .10, with an overall F(9, 131) = 2.36, p < .05. However, for Internal team collaboration, change R2 = .03, with an overall F(7, 133) = .75, p = .62.

Looking at the coefficients of the variables, Client engagement was significant and positive in all three models: For Client-team collaboration, Client engagement b = 1.04, t(139) = 3.20, p < .01; for Internal team collaboration, Client engagement b = .76, t(143) = 2.21, p < .05; and for Project executive-team collaboration, Client engagement, b = 1.49, t(139) = 3.98, p < .01. Across all types of collaboration, higher-rated client engagement was associated with a perceived higher quality collaboration. These findings provide consistent support for H1 that higher client engagement will be positively related to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients – and H4 that this is true over and above the effects of demographic and program variables.

Across the three models, the coefficients provided no support for H2 that project social purpose would be positively related to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients. More specifically, the Social purpose coefficient was non-significant in both the Client-team collaboration and the Internal team collaboration models. For the Project executive-team collaboration model, the coefficient was negative, b = -1.13 t(139) = -2.48, p < .05, suggesting that Social purpose was associated with a perceived lower quality of collaboration with project executives.

Finally, in the fourth step, Professor contribution was entered, and it explained a significant proportion of additional variance in all three models. For Client-team collaboration, change R2 = .12, with an overall F(10, 130) =

Table 5

Final Hierarchical Regression Models for Incrementally Testing the Contributions of Client Engagement and Social Purpose, then Professor Contribution, for Explaining Client-Team, Internal-Team and Project-Exec-Team Collaboration Measures

Outcomes	Client-Team Collaboration[j]				Internal Team Collaboration[j]				Project Executive-Team Collaboration[j]			
	b	SE	R^2	Change R^2	*b*	SE	R^2	Change R^2	*b*	SE	R^2	Change R^2
Step 1: Demographic Variables												
Gender[a]	.39	.32			.08	.34			.09	.38		
Race[b]	.35	.36			.43	.37			.10	.40		
Years of Professional Experience[c]	.01	.02			.03	.02			.01	.02		
			.04				.05				.02	
Step 2: Contextual Variables												
Modality[d]	-.42	.32			-.69*	.34			-.44	.37		
MBA Program Type[e]	-.57	.32			-1.16**	.34			-.52	.38		
Profit/Non-Profit[f]	.10	.35			.01	.37			-.54	.40		
Years Since Taking Course[g]	.02	.06			.03	.07			.09	.07		
			.07	.03			.14**	.09**			.04	.02
Step 3: Client Engagement and Social Purpose												
Client Engagement[h]	1.04**	.33			.76*	.34			1.49**	.37		
Social Purpose[i]	-.37	.39			-.54	.42			-1.13*	.46		
			.13*	.06*			.17**	.03			.14*	.10**
Step 4 – Professor Contribution												
	.26**	.06			.16*	.06			.37**	.07		
			.25**	.12**			.21**	.04*			.30**	.16**
(Adjusted R^2)			(.19)				(.15)				(.25)	

Note. Due to missing data, slight differences in Ns; Client-team (N = 141); Internal team (N=145); Project Executive-team (N = 141); *b* is unstandardized regression weight, SE = standard error; *p < .05, **p < .01; all two-tailed; [a] Gender, 1 = male, 2 = female; [b] Race, 1= White, 2 = Non-white; [c] Years of Professional Experience – number of years; [d] Modality , 1= online, 2 = in-person; [e] MBA Program Type, 1= Part-time, 2 = Other; [f] Profit/Non-Profit, 1 = profit, 2 = non-profit; [g] Years Since Taking Course, 1 = 2021, 2 = 2020, 3 = 2019, 4 = 2018, 5 = 2017, 6 = 2016, 7 = 2015, 8 = 2014, 9 = 2013; [h] Client Engagement, 1 = lower, 2 = higher; [i] Social Purpose 1 = no, 2 = yes; [j] Client-Team, Internal-Team, and Project-exec Team, 0 (not at all) to 10 (extremely well).

4.22, $p < .01$, and $b = .26$, $t(139) = 4.45$, $p < .01$; for Internal team collaboration, change $R2 = .04$, with an overall $F(10, 134) = 3.57$, $p < .01$, and $b = .16$, $t(143) = 2.50$, $p < .05$; and for Project executive-team collaboration, (change $R2 = .16$), with an overall $F(10, 130) = 5.65$, $p < .01$, and $b = .37$, $t(139) = 5.52$, $p < .01$. These findings provide consistent support for H3 that higher professor contribution will be positively to perceptions of the quality of collaboration within teams, with project executives/supervisors and with clients – and H6 that this is true over and above the effects of demographic and program variables.

Summary of Main Findings

The factor analytic, open item, correlation and regression results collectively supported RQ1, the possibility of developing three simple, reliable and valid scales for measuring perceptions of three kinds of collaboration – within-team and between teams and clients and project executives/supervisors – that are part of the larger set of managerial competencies taught in MBA programs. T-tests, correlation and regression analyses together indicated that client engagement and professor contribution were positively related to all three types of collaboration (support for H1, H3, H4 and H6), but that project social purpose had negative relationship to collaboration between teams and project executives/supervisors and no relationship to within-team or team-client collaboration (no support for H2 and H5).

Discussion

In this paper, we focus on collaboration as an increasingly in-demand managerial competency (Benishek & Lazzara, 2019; Moldoveanu & Martin, 2008; Rubin & Dierdorff, 2009); develop simple, reliable and valid scales for measuring MBA alumni perceptions of the quality of collaboration within teams, with client and with project executives/supervisors; and test the contribution of client engagement, project social purpose and professor involvement in the perceived development of collaboration competencies. Our results make four contributions to measurement, theory and/or practice.

Contributions

The first contribution of this study was to use exploratory factor analysis, supported by qualitative analysis of an open item response, to develop three distinct, reliable, valid and simple scales that researchers, faculty and MBA program administrators can use to measure perceptions of collaboration across three levels: client-team (across organizational boundaries), internal (within-) team, and with project executives (supervisors) (LeMaire et al., 2017; Sroufe & Ramos, 2011; 2015). A next step in this research might be to dig more deeply into the dynamics influencing each type of collaboration, such as peer and small group dynamics for within-team collaboration, supervisory power dynamics for team-project executive collaboration, and cross-boundary and status (and power) dynamics for team-client collaboration.

The second contribution is to provide evidence that a formal rater-based measure of client engagement in projects plays an important role in students' perception of the quality of the collaboration they experience in the capstone – within their teams, with their clients and with their project executives/supervisors. This is consistent with findings that team performance and student learning in such classes are affected positively by effective client engagement (Cummings & Yur-Austin, 2022; LeMaire et al., 2017) and negatively by ineffective client engagement (Kloppenborg & Baucus, 2004). It also underlines the practical importance to the teaching of a client-oriented, project team-based MBA capstone course of finding clients' who can commit the necessary time, attention, background materials and introductions (LeMaire et al., 2017; Nikolova & Andersen, 2017; Sroufe & Ramos, 2011).

More theoretically, first-hand observation of project groups and the responses to the open-ended question in the survey suggest that the mechanism for the effect of client engagement on the development and practice of a collaboration competency may have to do with the engaged client providing to the project both a shared goal and a sense of meaning – in effect, "important executives are paying attention to our work, so this must be relevant, useful and worth our working together well to satisfy them." Goal and purpose have been shown to be important contributors to team performance generally (Kozlowski & Ilgen, 2006); it would be useful to explore whether these, and/or other mechanisms, link client engagement to the development of collaboration as one of a set of managerial competencies.

As a third contribution, and despite increasing discussion of the ways in which social purpose provides a common goal, meaningfulness and so motivation for employees to join, stay with and work harder for that purpose-driven company (Henderson & Van den Steen, 2015), as well as for MBA students to engage more deeply with their studies (Sroufe & Ramos, 2011), we found no evidence that project social purpose enhanced the development and practice of collaboration competencies. This null finding might have been partially a casualty of our limited rater-based binary measurement (with only 26% of projects rated as having social purpose). Also, it might be that social purpose motivates different people in different ways, depending on how close a fit there is between the organization's, or project's social purpose, and their own social purpose commitments (Fairfax et al., 2023). If individual students and the project executive responded in conflicting ways to a project's social purpose, that might in fact hinder collaboration.

A fourth contribution is evidence that suggests that the greater a professor's perceived contribution to a project as a facilitator, the higher the students' perception of the quality of the collaboration they experience in the capstone – within their teams, with their clients and with their project executives/supervisors. This is very encouraging given the framing of this item as "In addition to your project executive, how much did your professor contribute to

your team's overall learning?" It is also consistent with the idea that the role of a professor in a hands-on, experiential, problem-based course is more as a designer, facilitator, coach and provider of feedback (Cummings & Yur-Austin, 2022; LeMaire et al., 2017; Nikolova & Andersen, 2017) than as an expert lecturer who is the focus of the learning experience (Kolenko, Porter, Wheatley, & Colby, 1996).

A fifth contribution is our provision of details of the structure of the long-lived, large-scale, and impactful (hundreds of millions of dollars of investment linked to team recommendations) client-oriented, project team-based MBA capstone course that is the context of this research. Team-based work on live projects (some with clients) is no longer uncommon in MBA programs, and other client-oriented, team project-based, MBA courses have involved expert advisors in helping teams (e.g., Cummings & Yur-Austin, 2022; Kloppenborg & Baucus, 2004; Nikolova & Andersen, 2017). However, we believe this example is unusual – and we hope useful – in the intensity of the supervision provided by the project executive and faculty (recruiting and training project executives, weekly faculty project executive coordination meetings, twice-weekly meetings between project executives and teams) and the intentionality of the workshops, modeling and feedback (formal rubrics and informal coaching) used to connect competency development – including collaboration – with project work, and the relationship building effort, reinforced by a sliding-fee scale, that goes into ensuring strong client commitment to projects and students. Perhaps this model can serve as a partial response to recent calls to add more professional supervision to project-based courses (e.g., Roethlein et al., 2021 for supply chain and LeMaire et al., 2017 for MBA management consulting).

Finally, the lead professors have, over the years, developed experience in facilitating learning as much through the management of project executive and client relationships as through the delivery of classroom workshops, curriculum design and assessments. The results of this study suggest that each of these components – project executives, client engagement and professor contribution – have positive influences on various levels of collaboration, and yet the relatively large unexplained variance also argues that there is plenty more to learn about the factors and practices that ensure effective collaboration.

Clues, Limitations and Future Research

Although this research has a number of strengths – such as the mixture of self-report survey data with project-specific observations, including professors' ratings (drawn from notes, correspondence and client management software); and the depth of collaboration experience embedded in the course itself, as partially reflected in the open item comments; and the inclusion of a number of control variables – it also has a number of limitations. We report on three types of limitations.

First, the usable data response rate was a disappointing 13% of capstone course alumni from a nine-year span. Reasons for this low response rate might include the time lag involved (although we received responses from all years), the quality of the email records available (university emails, no personal emails), and possibly the request for enough detail to allow the authors to identify specific projects and so facilitate the coding of project social purpose and client engagement. Respondents unable to recall such detailed information may have opted out from participating. Respondents who did not enjoy the capstone experience may have also declined to participate when initially contacted by email. Further, our survey design may have been partly to blame in that a large number of respondents abandoned the survey at the point of the free-response open item and before getting to the closed-response items used for scale creation and regression analyses.

Although the overall sample size of n = 167 was sufficient to run the factor and regression analyses reported here (Stevens, 1996), a larger sample size would have facilitated more refined analysis; for example, small subsamples within several variables required the collapsing together of categories such as professional (part-time) MBA program type versus "other MBA" programs, or white versus non-white students, as well as collapsing government and non-profit organizations together. Also, the relatively small sample size may have contributed to the lack of observed variance related to demographics. To generalize the applicability of the scales and regression outcomes, it would be important to obtain responses from a broader demographic and a wider array of programs and project-based MBA capstone courses.

Second, the retrospective, self-report nature of the study is clearly a limitation in that it is impossible to truly control for memory bias still affecting the results, especially because the alumni's experience in the time between taking the course and responding to the survey is sure to affect their perceptions. For example, to the extent that is generally seen as a positive trait, respondents might be more likely to self-report higher collaboration than was actual, as part of an inflation/social desirability bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), and/or remember only the parts of the capstone experience that turned out to be relevant to their work experience after the course. On the other hand, part of the goal of the study was to assess the competency development that alumni remember from and attribute to the capstone; their memories may not be completely accurate, but there is still value in learning what they perceived to be the case, especially in the light of subsequent experience. Finally, the concerns about the effects of time may be partially alleviated by the fact that the independent samples t-test results showed no mean variable differences between those who had taken the course 5 to 9 years before responding versus those who had taken the course only 1 to 4 years before responding.

A third limitation is that although several variables were independently verified by course records and other variables were rater-generated, the research design is still heavily based on cross-sectional, self-reported, perceptual data (Spector, 2006). While not ideal, research suggests that cross-sectional research designs can still provide evidence for variable relationships and inflated results due to self-report common method variance are often overstated, particularly when other sources of data are included and relevant control variables (such as those used here) are employed to rule out spurious relationships (Podsakoff, et al., 2003; Spector 2021). More troubling is the lack of more nuanced ratings for client engagement and social purpose (versus the binary ratings used here) and the limitation that the professor contribution variable consisted of only one item, which did not allow for computing a reliability estimate. However, prior research has not formally utilized rater-based client engagement and social purpose measures. As such these one-item measures can be a useful potential starting point for future research. Matthews, Pineault, and Hong (2022) have argued for the general validity of one-item measures.

Future research would benefit from improvements in the design and measures, including: rearranging the order of the survey items; using confirmatory factor analysis on the three new collaboration scales; including greater distinctions between levels of client engagement; supplementing rater-based client engagement perceptions with student-based perceptions; collecting measures of collaboration at several points in time, perhaps during the class (including peer ratings) and at several points after graduation (Sroufe & Ramos, 2015); and adding measures of collaboration behaviors rather than the perception of collaboration. Similarly, the regression models could be made more robust by adding additional variables that might explain collaboration, such as more precise measures of cross-functional integration (collaboration, coordination and communication – see D'Souza, Bement, & Cory, 2022); conflict resolution (Behfar, Mannix, Pererson & Trochim, 2011); students' emotions during the interactions (collected through reflection papers – see Walsh, 2023); and insights into the client-project executive relationship.

Finally, there were two intriguing, partial findings that suggest additional research opportunities. First, there were several indications that matching teams with project executives/supervisors might well be a delicate proposition, even allowing for the fact that the relationship is a supervisory one. For example, the scale mean for the Project executive-team collaboration scale was significantly lower than those for the Client-team and Internal team collaboration scales, suggesting a generally lower level of collaboration between teams and project executives. Also, there was a negative relationship between social purpose and project executive-team collaboration, suggesting that the comfort of teams and project executives with social purpose projects might not align. In addition, several of the open item comments referred directly or obliquely to the challenges of managing the team-project executive relationship. These hints suggest that there would be value in exploring the project executive-team relationship in much more detail to determine what distinguishes a relationship that enhances the quality of collaboration, work and learning versus one that hinders these.

Second although the regression analysis showed no systematic connection between perceived quality of collaboration at any level and demographics, years of professional experience, or program-related variables, program type (part-time MBA v. other) and modality (online v. in-person) did show a small but significant effect on internal team collaboration, with part-time and online both associated with increased collaboration. Although this may seem surprising given research that suggests that team performance and cohesion may suffer in online settings (Grossman Nolan, Rosch, Mazer, & Salas, 2022; Olson & Olson, 2012), the faculty's anecdotal experience suggests that the online and part-time MBA students bring a more experience and a professional demeanor to the capstone whereas the less experienced students from the and full-time / global MBA cohorts seem to be more likely to organize into cliques that affect within-team collaboration. The findings and anecdotal insight suggest an opportunity for a social network analysis study that relates cohort network structure to collaboration and/or team dynamics.

Conclusion

This analysis of alumni experience of a unique client-oriented, team project-related MBA capstone yielded encouraging results including a set of simple, reliable and valid scales for measuring collaboration within teams, between teams and clients, and between teams and project executives / supervisors; insight into the influence of client engagement and faculty contribution factors that shape the experience and practice of collaboration at all levels; and ideas for structuring and managing project-oriented capstones to enhance competency development. Such competency development, given that a goal of the MBA capstone is to train students "how to think and implement decisions like a senior manager" (Kachra & Schnietz, 2008, p.504). We hope that these findings as well as the details of running this capstone, especially the professor's role in facilitating client engagement and project executive involvement and fit with team, will inspire other professors to try and improve on this approach and share their experiences so that more students can reap the benefits of deeply engaged and engaging learning that also helps client organizations thrive.

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