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# Statistical Analysis of Teamwork Skills in Generation-Z Business Students: A Proposed Design for Team-Based Final Exams

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**Abstract:** This paper explores the team-based test (TBT) experience that Generation-Z undergraduate and graduate business students perceive within one Higher Education Institution (HEI). It uses these perceptions in proposing a team-based final exam (TBFE) design. A two-stage qualitative study was conducted. Students' perceptions were first identified through a thematic analysis of their post-test written feedback, then further contextualized through findings from a series of fourteen semi-structured interviews. The results were used to propose a TBFE design. Two key streams of findings emerged from the study. The first illustrated how TBTs help reduce test stress before, during, and after the assessment while enhancing students' teamwork skills. The second stream of findings aided in generating a proposed TBFE design. Findings also suggested that TBFEs be conducted within workshop-based course designs and that TBFEs be case-based where students receive the test case and guidelines several days before the exam. Statistical analysis revealed the positive effect of TBTs on all course-intended learning outcomes (CILOs), including teamwork and leadership, communication, and problem-solving skills, particularly for the undergraduate courses. The proposed design may be used to enhance Generation-Z students' teamwork skills in the higher education (HE) sector with aims to prepare graduates for the demands of a modern work world. The findings could inform policies, guidelines, or support resources for designing TBTs and TBFEs which serve business educators.

**Keywords:** Generation-Z, Team-based tests, Team-based final exams, Teamwork skills, Business education.

## 1 Introduction

The term Generation-Z (Gen-Z), those born between 1995 and 2010, started to become popular in the year 2013 with the first cohort entering universities worldwide (Seemiller and Grace, 2017; Sparks and Honey, 2014). Today, the changed nature of work in contemporary organizations coupled with an unprecedented influx of Gen-Z job seekers into the labor market (Yılmaz *et al*., 2024) demands a new set of employability skills from HEIs (Md Sajjad *et al*., 2023; Twyford and Dean, 2024). Teamwork is among such skills (Francis *et al*., 2025; Kutlák, 2019; Kyrousi *et al*., 2022; Md Sajjad *et al*., 2023). To address this demand, universities are shifting their teaching and learning methods to active team-based learning strategies (Espey, 2022). For example, teamwork skills have been widely incorporated into the HE learning environments using team-based learning through team assessments such as team projects and class activities (Augar *et al* 2016; Creo *et al*., 2021; Espey, 2022). Furthermore, business education is emphasizing the need to align teaching methods with the United Nations Sustainable Development Goals (UNSDGs), focusing on teamwork skills such as connectivity and networking, resilience, and relatedness (AlDhaen, 2022; Buerkle *et al*., 2023). Team-based tests (TBT), also known as team exams (DeRuisseau, 2010; Stark, 2006), are a type of team assessment defined as a set of graded "learning activities undertaken by two or more students [where] the grade contributes to a student's overall result" (Augar *et al*., 2016, p.1151). However, TBTs are generally more common in professional HEIs that offer profession-focused vocational programs such as information technology, accounting, engineering, hospitality and tourism, and health sciences (e.g. Aoe *et al*., 2022, DeRuisseau, 2010; Eldakhakhny *et al*., 2024; Jacobs *et al*., 2001; Khansari and Coyne, 2018; Lin and Chang, 2022; Schmulian and Coetzee, 2019; Tejada *et al*., 2016). And, although academic literature has found great benefits in intra-semester TBTs (LeFebvre *et al*., 2024; Stark, 2006), team-based final exams (TBFE) on the other hand have received less attention by the HEIs, including business colleges.

Unlike any other generation, Gen-Zers are digitally connected with access to limitless information leading to the attainment of unprecedented abilities such as instant inquiry and learning by doing (Saberi, 2020). Soft skills such as collaborative teamwork, however, are not among this generation's strong suits especially when it comes to team-based learning (Kyrousi *et al*., 2022; Lin and Chang, 2022; Saberi, 2020; Serafin *et al*., 2020). In modern businesses, teams have become the primary means of work, as they are essential for completing a variety of tasks and projects as well as maximizing organizational effectiveness (Shah *et al*., 2023). In addition, workplace decision-making processes have become "consensus-based" through "participatory division of labor" (Leach, 2016, p.63). Therefore, employers today insist that

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graduates acquire transferable employability skills such as teamwork and collaborative self-directed learning (Augar *et al.,* 2016; O'Regan *et al*., 2023; Rodríguez *et al*., 2019; Woezik *et al*., 2021). In this regard, traditional academic student learning and assessment methods no longer serve the demands stressed by the current "soft-skills" oriented world economy (Espey, 2022; Kyrousi *et al*., 2022).

### *1.1 Research problem*

Many campus environments and their teaching methods have currently been designed to accommodate previous generations. This in turn can neither adequately meet the learning preferences of Gen-Z students nor enhance current essential employability skills such as teamwork (Seemiller and Grace, 2017). Therefore, pedagogies such as industry-based projects, and internships are not enough to enhance teamwork in Gen-Z graduates (Augar *et al.,* 2016); as these are mainly offered during senior college years. This young generation will need a college education system that immerses students in team-based experiences from day one through both learning as well as assessment techniques. In this study, it is argued that for business colleges to achieve assurance of learning for Gen-Z students regarding employability skills such as teamwork, critical analysis, creative problem solving, communication, and self-directed collaborative learning, team assessments practiced through course group projects, class activities, and TBTs, should also include TBFEs. Such holistic team assessment pedagogies would simulate students' future work environment in a more accurate manner and graduate Gen-Zers ready for the demands of the modern economy (Kyrousi *et al*., 2022; Rodríguez *et al*., 2019).

### *1.2 Objective of the paper*

The objective of this paper is to explore the TBT experience that Generation-Z undergraduate and graduate business students perceived within one HEI and to use these perceptions in proposing a TBFE design.

### *1.3 Research Methodology*

A two-stage qualitative study was conducted. Students' perceptions were first identified through a thematic analysis of their post-test written feedback, then further contextualized through findings from a series of fourteen semi-structured interviews. The results were used in proposing a TBFE design. In addition, statistical analysis was conducted to assess the effect of TBTs on all course-intended learning outcomes (CILOs).

## 2 Literature Review

### *2.1 Teamwork skills for Gen-Z business students*

According to research, team members today are expected to adapt to rapidly changing environments, therefore need new skills such as conflict management, accountability, trust, collaboration, adaptability, cohesiveness, communication skills, and task coordination, through which effective team performance and organizational goals are attained (Brock *et al*., 2017; Creo *et al*., 2021; Riebe *et al*., 2010; Rodríguez *et al*., 2019; Sten *et al*., 2023; Woezik *et al*., 2021). Today, companies worldwide have established that teamwork quality is critical to creating business competitive advantage and so are assigning complex projects to agile work teams while expecting individual team members to be responsible for contributing to the success of the team (Agbejule and Lehtineva, 2022; Baviera *et al*., 2022; Shah *et al*., 2023; Sundlin *et al*., 2022; Williams, 2024). Teamwork skills have therefore become "transferable across careers in a range of business functions" (Kyrousi *et al*., 2022, p.666). Moreover, business colleges have realized Gen-Zers' innovative entrepreneurial initiatives (Iorgulescu, 2016; Robert Half, 2015) in addition to the significant impact of teamwork competencies on the quality of entrepreneurship skills as well as entrepreneurial team performance (Pazos *et al*., 2022; Rodríguez *et al*., 2019). This has in turn led Gen-Z business students to appreciate teamwork as a set of significant soft skills needed to enhance their leadership skills, employability, and career success (Kyrousi *et al*., 2022; Twyford and Dean, 2024; Yılmaz *et al*., 2024). To address these needs, business colleges have developed training methodologies that would enhance Gen-Z students' teamwork skills (Baviera *et al*., 2022; O'Regan *et al*., 2023) by projecting the generations' unique innovativeness and self-directed learning abilities onto collaborative team settings (Rodríguez *et al*., 2019) where flipped team-based learning and assessment methodologies are applied (Espey, 2022; Tsai *et al*., 2023).

### *2.2 TBTs contribution to teamwork skills development*

Traditional assessments are designed to identify students' ability to recall someone else's collected data no longer work with Gen-Zers (Markant and Gureckis, 2014). Therefore, tests have become an extension of students' learning experience by evolving into active team-based collaborative learning methodologies that focus as much on enhancing work-related soft-skills like teamwork, as on specialized technical skills (Aoe *et al*., 2022; Michaelsen *et al*., 2002). According to literature, team assessments enhance group critical thinking, reasoning, and team decision-making (Eldakhakhny *et al*., 2024; Espey, 2022; Langer *et al*., 2021). Furthermore, an important aspect of all team assessments is that they follow a learner-centered strategy which prompts collaborative self-directed team-based learning where students support each other in

understanding complex course material (Creo *et al*., 2021; Gupta *et al.*, 2025; Ibrahim *et al*., 2023; Şişman *et al*., 2018; Tsai *et al*., 2023). TBTs create such active learning experiences around units of instruction related to given case studies that require team members to prepare for outside of the class, then complete in-class competency team testing containing application-focused activities while guided by a faculty facilitator who further enriches the learning experience by providing instant feedback during the test (DeRuisseau, 2010; Langer *et al*., 2021; Michaelsen *et al*. 2002; Tsai *et al*., 2023). According to Woezik *et al*. (2021), self-directed learning in teams is driven by 'feelings of responsibility', 'idea exploration stimulated critical thinking', and 'relatedness' (*op cit*. p.590) which in turn leads to "enhancing learners' abilities to integrate concepts and skills, thereby cultivating competence in problem-solving and teamwork" (Tsai *et al*., 2023, p.510). Moreover, a recent study by Sacramento *et al*. (2023), involving business students' project teams and professional teams from the automotive and healthcare industries, found that the collective team members' feeling of being in a psychologically safe environment, where they can freely express their ideas and thoughts, enhanced overall team creativity.

During TBTs, while peers make sure the team's progress is on track, communication is enhanced within the team. This leads to maximized collective team brainpower, and hence, teamwork effectiveness (Baviera *et al*., 2022; Stark, 2006). Moreover, the collaborative learning environment created during TBTs has been found to significantly reduce test stress (Ibrahim *et al*., 2023; Reinig *et al*., 2014; Şişman *et al*., 2018). One contributor to test stress reduction is having the same test team members work together from the beginning of the semester on class activities and projects (Riebe *et al*., 2010; Reinig *et al*., 2014) so by the time the TBTs are due, each team would have managed its way passed the 'storming' stage of teambuilding and achieved 'group cohesion' (Tuckman, 1965).

*2.3 TBFEs in business education*

Gen-Z students are known for their hands-on learning style and a preference for face-to-face educational environments where direct implications to real-life examples are provided (Iftode, 2019). Although HE teaching and learning methods have addressed the needs of this highly kinesthetic generation by shifting to practical team-based strategies (Lin and Chang, 2022; Rodríguez *et al*., 2019), all forms of team assessments including TBTs, thus far, are limited to the duration of classes and practical lab hours not including final exams (e.g. Espey, 2022; Langer *et al*., 2021; LeFebvre *et al*., 2024; Markant and Gureckis, 2014; Rodríguez *et al*., 2019; Şişman *et al*., 2018; Tsai *et al*., 2023; Woezik *et al*., 2021). Moreover, despite research in business education declaring the benefits of TBTs, particularly in providing a natural experiential environment for group performance (Stark, 2006), research on formal policies and designs of TBFEs for business colleges is, to date, limited.

Recent research by Eldakhakhny *et al*. (2024) concludes that TBTs extend students' learning experience during the test due to group discussion and sharing of ideas through close communication and immediate peer feedback while collaborating in solving complex tasks. Furthermore, Eldakhakhny *et al*. (2024) found that specifically open-book TBTs, in addition to removing test stress, prepare students "for the open-book world they would encounter during their career with operational decision-making, increasing their confidence in their capability to work under challenging conditions" (*op cit*., p.13). Although this study was conducted on medical students, its practical implications are applicable in business programs by addressing the demands of the business world for more stress-enduring teamwork skills (Yawson and Yamoah, 2023). Such TBTs have been found to encourage even poorly performing learners to contribute to their teams and ultimately enhance their teamwork skills (Van Winkle *et al*., 2017). Unlike any other generation, Gen-Z students have had the privilege of having round-the-clock access to unlimited information (Seemiller and Grace, 2017). Therefore, having Gen-Z business students experience collaborative self-directed team-based learning throughout the semester only to be assessed through a traditional closed-book individual final exam is highly contradictory.

Research has shown, however, that both students and their assessors find TBTs challenging. Riebe *et al*. (2010) for example, found grading as one main challenge where students perceived poor teamwork results as harming their future career and higher degree pursuits; while assessors found that the team's final product may not necessarily be evidence of individual members' teamwork skills (Riebe *et al*., 2010). Another challenge is possible freeriding, particularly in teams larger than four members, where some members put less effort into answering the test questions and yet get the same grades as higher-performing team members (Felder and Brent, 2007; Francis *et al*., 2025). These challenges can be overcome by reducing team size to ensure all team members collaboratively complete the test tasks, consequentially aiding a fair and representative skills assessment (Rodríguez *et al*., 2019). Moreover, a study by Iorgulescu (2016) revealed that Gen-Z demands continuous development and mentoring. Therefore, immediate formative feedback (IFF) given either by peers (Riebe *et al*., 2010) or by the course instructors (Francis *et al*., 2025; Schmulian and Coetzee, 2019; Schneider *et al*., 2018), during the team tests, may address this demand while serving as another solution to the challenges of TBTs.

## 3 Research Questions

Although the literature has revealed the benefits of TBTs, none have used these findings to design TBFEs for business

colleges. Therefore, understanding students' perception of TBTs as well as their experience of teamwork skills development during these tests is essential. The present study therefore aims to examine the following research questions:

***RQ1.*** What are the perceptions of undergraduate and graduate Gen-Z business students of TBTs?

***RQ2.*** How do undergraduate and graduate Gen-Z business students perceive their experience of teamwork skills development during TBTs?

Studies illustrating TBT designs in different fields of knowledge, do not include TBFEs (see for example Aoe *et al*., 2022; Augar *et al*., 2016; Baviera *et al*., 2022; DeRuisseau, 2010; Khansari and Coyne, 2018; Reinig *et al.* 2014; Schmulian and Coetzee, 2019; Stark, 2006; Tejada *et al*., 2016; Van Winkle *et al.*, 2017). Hence, it is essential to answer the following question:

***RQ3.*** What are undergraduate and graduate Gen-Z business students' expectations of an ideal TBFE design?

## 4 Methodology

### *4.1 Research design*

In addressing the research questions, a two-stage qualitative study was implemented. Students' perception of the TBTs (RQ1) as well as their experience of teamwork skills development during the TBTs (RQ2) were first extracted through qualitative analysis of twenty-five post-test feedback reports followed by fourteen transcripts of semi-structured interviews. The interview transcripts were further analyzed to address students' expectations of an ideal TBFE design (RQ3).

### *4.2 Sampling – data collection procedures*

The selected HEI is a private university in Bahrain (Ahlia University) established in 2001. The Institution has a heritage of highly ranked assessment policies (Ahlia University, 2020) associated with the alignment of its teaching and learning strategies with international labor market needs particularly those regarding transferable employability skills (Ahlia University, 2024). Furthermore, as Bahrain's economy is more commercial-oriented, business jobs are in relatively higher demand (Bahrain Economic Development Board, 2024). Therefore, the university's College of Business and Finance has focused on enhancing both undergraduate and graduate students' transferable skills by implementing multiple student-centered teaching and learning methodologies such as game-based learning and learning by designing games (Amara and Saberi, 2018), as well as project and case-based learning (Ahlia University, 2020). However, TBTs and TBFEs are not common in the Institution. In addition, the Business college has adhered to specific employability skills frameworks such as the Association to Advance Collegiate Schools of Business (AACSB) which emphasizes skills like teamwork (Shinn, 2024). Furthermore, as Gen-Zers are currently found at both undergraduate and graduate levels, this research sample included both undergraduate and graduate business students. By obtaining students' views from both degree levels, it was possible to accommodate a better TBFE design to Gen-Zers' needs.

Over two semesters during the academic year 2022 – 2023, a total of six business courses (four undergraduate and two graduate) had pilot TBTs implemented as their midterm written assessment. More than ninety percent of all students in these business courses were Gen-Zers. The sample courses are further explained in Table (1). All six courses were designed as student-centered project-based courses. At the beginning of each semester, students were randomly distributed into their course project teams using a raffle draw (Huxham and Land, 2000). This method was applied to simulate the workplace environment where employees usually do not select their work colleagues. The project teams held between three to five members depending on the number of students registered in each course. The same team members met in class for a total of forty-two hours throughout the semester; out of which twenty-eight hours were workshop-based during which students addressed their course project tasks by applying theory to practice. Course WhatsApp groups were also formed by each team to facilitate a continued stream of communication and increase teamwork efficiency. The same project team members conducted the TBTs (Heber *et al*., 2024). By the time the course project team members met for the TBTs, they had completed an average of fourteen hours of class workshops together.

**Table 1:** TBTs sample courses

| Semester | Course Code | Course-Title | Level (degree) | Registered students | Project teams per course | Post-test feedback reports per course | Interviews per course |
|---|---|---|---|---|---|---|---|
| Second 2022-23 | MAKT310 | Consumer Behavior | Undergraduate (BSc Management & Marketing) | 19 | 4 | 3 | 1 |
| | MAKT421 | Marketing Strategy | | 13 | 3 | 2 | 2 |
| | MAKT519 | Marketing Management | Graduate (MBA) | 19 | 4 | Sent during summer 22-23 after taking MAGT564 | |
| Summer 2022-23 | MAGT323 | Human Resources Management | Undergraduate (BSc Management & | 5 | 1 | 2 | 1 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | ETHC391 | Business Ethics | Marketing, MIS, Banking & Finance, Accounting & Finance) | 16 | 4 | 4 | 3 |
| | MAGT564 | Leadership in Organizations | Graduate (MBA) | 26 | 6 | 14 | 7 |
| **Total undergraduates 53**<br>**Total graduates 45** | | | | **98** | **22** | **25** | **14** |

Before the TBTs, students were briefed on the test process and design through guidelines posted on the course's e-learning system. TBTs were case-based, students received the test cases four days prior test date to encourage team members to prepare for the test together. Furthermore, students were allowed to bring summary sheets consisting of study notes together with a printout of the test case to the TBT venues. During the tests, each project team sat in clusters separate from other teams. Test durations varied from two hours for undergrads to two and a half hours for graduate students. Each team worked on one common answer sheet. Halfway through each TBT, the course instructor initiated IFFs (Schmulian and Coetzee, 2019) by formatively assessing each team's test performance. The IFF assessment method has proven to enrich students' learning experience while significantly reducing test stress unlike traditional tests which induce stress and where students neglect post-test feedback given after releasing the scores (Schmulian and Coetzee, 2019; Schneider *et al*., 2018). Once receiving IFFs, students edited their answers accordingly before submitting the team's common answers sheet.

Stage-1 focused on the Gen-Z business students' perception of TBTs and teamwork skills development during the TBTs (RQ1, RQ2). The data set included students' post-test feedback reports sent directly to the course instructor on WhatsApp. All ninety-eight students were requested to send the reports. A total of twenty-five reports were received (ten undergraduates and fourteen graduates). The thematic analysis conducted on the students' feedback reports yielded the research's initial themes which in turn helped design stage 2 of the study.

In stage 2, further analysis was performed on the themes developed during stage 1 (RQ1, RQ2). This allowed exploring students' expectations of an ideal TBFE design (RQ3). During this stage, the second data set was produced over three weeks (Summer 2023) through fourteen semi-structured interviews conducted via video conferencing, each with an approximate duration of 50 minutes. The interviewees were Gen-Zers from the same sample which sent the post-test feedback reports (seven undergraduates and seven graduate business students). These interviews' main purpose was to generate more detailed data. This could be used to enhance and support the researcher's interpretations of the students' perception of their TBT and teamwork experience during these tests, in addition to helping with the construction of the proposed TBFE. The results obtained from stage 1 were used to design the semi-structured interview questions which would further clarify the emerging research themes. Interviews were conducted sequentially, as the available data was reflected upon simultaneously at each point in the process. This helped in deciding whether additional data was needed.

Each interview started with a brief clarification of the purpose of the interview. After allowing participants to freely express their perceptions of their teamwork experience during the TBTs and elaborate on the advantages and disadvantages of their TBT experience from their own viewpoint, the interviewer prompted them to discuss the themes that resulted from stage-1 analysis. Then, the course of the discussion was channeled into a more in-depth view of the characteristics of a TBFE design for business courses based on the interviewee's perspective. Students were also asked about the means through which TBTs and TBFEs could contribute to enhancing their learning experience and teamwork skills.

*4.3 Data analysis*

An interpretive qualitative research approach was followed (Saunders *et al*., 2023). The same analytical approach was used across the data sets from both stages. Braun and Clarke's (2006) six-phase process thematic analysis was followed to analyze the data sets. The analysis was driven by the three research questions (RQ1, RQ2, and RQ3); therefore, a theoretical (top-down) thematic analysis was implemented (Braun and Clarke, 2006). Two levels of coding were performed, and themes were generated through an inductive process (Saunders *et al*., 2023). Initially, codes were generated by concentrating on the semantic content (Saunders *et al*., 2023). These codes were based on the explicit phrases present in the data. The second level of coding, on the other hand, generated latent themes as the aim was to find meanings underneath the semantic content of the data itself (Braun and Clarke, 2006). Initially, repeated reading of the data was done for familiarization purposes. During the second phase, the first data set (students' post-test feedback reports) was systematically collated into an initial set of codes which in turn were classified into potential themes (Maguire and Delahunt, 2017). In the third phase, the second data set (student interview transcripts) was analyzed where all data was gathered under each of the potential themes identified in the first data set and were then accumulated to form broader latent themes (Braun and Clarke, 2006). In the fourth phase, the themes were reexamined to ensure their fit with the coded extracts and the entire data set (Braun and Clarke, 2006). This resulted in removing some themes and merging others into higher-level themes (Maguire and Delahunt, 2017). Subsequently, a re-examination of the second data set was conducted to refine each theme, generate clear descriptions, and name each theme (Braun and Clarke, 2006). This led to the fifth stage where all emerging themes from the entire data set were changed to key sub-themes under three main categories of

dominant themes related to the three research questions (Braun and Clarke, 2006). The dominant theme representing RQ1 was labeled as "Students' perceptions of TBT", while "Teamwork Skills" represented answers to RQ2, and finally, those addressing RQ3 were placed under "TBFE Design". "Teamwork Skills", however, was eventually placed as a key subtheme under "Students' perceptions of TBT".

This process yielded two thematic maps (Map-1 and Map-2). The dominant themes in Map-1 (Figure (1)) provided answers to RQ1 and RQ2 while the ones in Map-2 (Figure (2)) answered RQ3. The themes from Map-1 also contributed to the design of Map-2 and hence to answering RQ3. In addition to the thematic maps, key subthemes, together with their relevant themes from the second data set, were initially identified using word frequencies and word clouds. This was after the third stage of thematic analysis. Furthermore, to reserve participants' confidentiality, alphanumeric coding was applied, i.e. N4-3-mba signifies MBA student N4 from the first data set who was interviewed third.

*4.4 Research ethics*

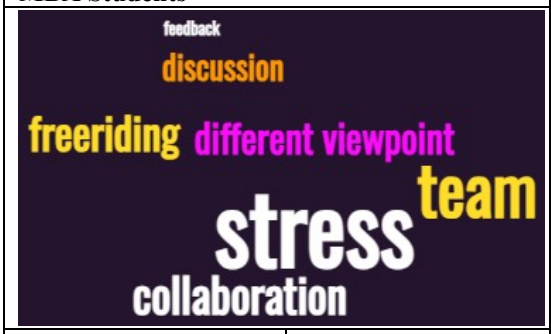
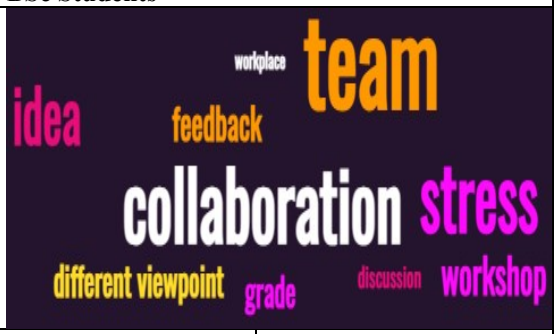
Throughout this research, ethical matters were addressed as follows: All students registered in the six sample courses were informed initially about their TBTs being piloted for research purposes. Informed consent was taken from all participants before data collection. Participation was voluntary and all participating students were assured of the ambiguity of their identities and that all collected data would be used strictly for research purposes and for the enhancement of future TBTs and TBFEs. The research was carried out following the Policy for Ethical and Safe Conduct of Ahlia University Intellectual Property (ver.1.0).

## 5 Findings

The resulting codes from the initial stages of analysis are presented in the word frequencies and word clouds in Table (2). Here, two separate word clouds illustrate a total of eleven codes representing both undergraduates' and graduates' perceptions of their TBTs experience. This separation helped compare the two groups in terms of any perceptual differences regarding TBTs.

In expressing their perception of the TBT experience, both degree business students' combined codes emphasized, in collective descending order of frequency, the words: "team" (65 times), "stress" (58 times), and "collaboration" (43 times), thus indicating their top perceived benefits relative to TBTs. The words "team" and "collaboration" clearly dominated the undergraduate interviews, while more emphasis was placed on "stress" in the graduates' interviews. Both groups focused, in collective descending order of frequency, on the terms "different viewpoints" (22 times), and then on "feedback" and "discussion" (19 times). Additionally, the undergraduates emphasized explicitly, in descending order of frequency, "idea", "workshop", "grade", and "workplace"; while the graduates focused on "freeriding".

**Table 2:** Word frequency visualization (Dataset-1) Gen-Z business students' perceptions of TBTs.

| **MBA Students** | | **BSc Students** | |
|---|---|---|---|
|  | |  | |
| Stress | 33 | Team | 45 |
| Team | 20 | Collaboration | 29 |
| Collaboration | 14 | Stress | 25 |
| **Freeriding** | **13** | **Idea** | **19** |
| Different viewpoint | 12 | **Workshop** | **12** |
| Discussion | 11 | Feedback | 11 |
| Feedback | 8 | Different viewpoint | 10 |
| | | **Grade** | **10** |
| | | Discussion | 8 |
| | | **Workplace** | **7** |

In general, the student's perceptions of their TBT experience were favorable. A significant core finding in this research however is that all key subthemes under "Students' perceptions of TBT" (RQ1) spanned through an entire time duration before, during, and after the TBTs. For example, students reported that the tests provoked collaboration, and self-directed learning, and significantly reduced their stress levels not only during the TBT but also before and after the tests:

*The way we prepared for the TBT made us feel professional. We reviewed journal articles, summarized, and reached the findings together. We learned proper citation and referencing…even helped us in writing the dissertation.* (T10-13-mba)

*RQ1. What are the perceptions of undergraduate and graduate Gen-Z business students of TBTs?*

During data analysis, four key subthemes emerged from "Students' perceptions of TBT". These were coded: "reduced-stress", "academic-matters", "prepare-for-workplace", and "teamwork-skills". Figure (1) visually represents the four key subthemes as the research's first thematic map.

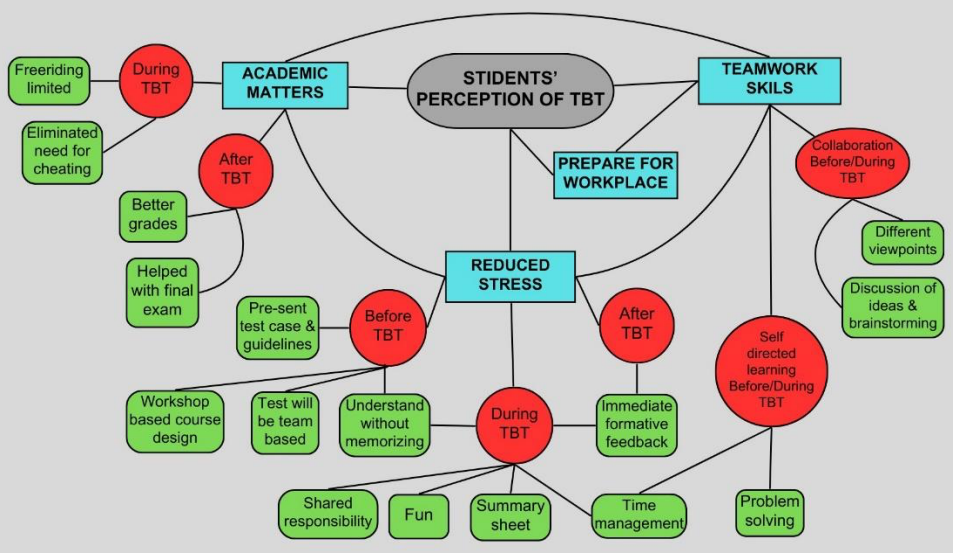



**Fig. 1:** Thematic Map-1. Students' perception of TBTs

*5.1 Reduced stress*

Students expressed that their test stress had notably reduced before, during, and even after the TBTs. The data analysis revealed several reasons for this occurrence. The course's *workshop-based-design* had prepared the students for a team-based work environment from the first week of classes where the same project teams worked together to complete in-class assignments. The following quotes from both graduates and undergraduates clarify this point:

*The course's design being workshop-based reduced stress during TBT because we get to know each other during the semester.* (V12-8-mba)

*before the TBT, I read the material covered during the class workshops [including] my colleagues' written viewpoints during those workshops…without the workshops [it would've been] more stressful and confusing.* (I9-2-bsc)

A second reason for reducing stress before the test was due to the test cases and guidelines being posted four days before the TBT. For the MBA and fourth-year BSc courses, the test case was mainly a journal article, more than 15 pages long, which students had to read before the test:

*Receiving the exam case four days pre-test was the main cause of reduced stress[…]we all read the case then asked each other about whatever was not clear to us, then we…integrated the notes together.* (T10-13-mba)

*At first, I was confused about how all this would work out. Then when you explained it to us through the guidelines, I was relieved and looked forward to the new group test.* (R8-11-mba)

Students also stated that knowing the test will be team-based gave them a sense of relief since preparation for, and workload during the test will be shared among the course project team members:

*We…knew we were going to work during the TBT as a team so studying and preparing was made easier and faster…I knew I could count on my team to answer things I had missed out and to help me out. The answers will be completed by us being a team.* (V12-8-mba)

A fourth reason is that students felt there was *no-need-to-memorize* when preparing for the test, instead, they *understood* the study material *without memorizing*:

*There was no memorizing, only understanding[…]the TBT helped us become fully aware of the course content while in the traditional system, a person would only memorize and when they are done, they don't need the content anymore.* (V12-8-mba)

*The TBT made me realize how much pressure we previously went through to memorize for individual tests. But in the TBT, we were able to learn from each other, solve problems, and share information.* (C3-7-bsc)

This is due to the tests being either open book where either computer and mobile devices or A4 summary sheets were allowed in the test hall. The summary sheet was frequently referred to as a"stress reducer" by both degree students during the research interviews. Such practice was encouraged particularly because the TBTs were case-based and so focused on assessing students' understanding, problem-solving, analytical and research skills, communication, and teamwork (Ahlia University, 2020):

*The summary sheet gave us more confidence…it gave us a piece of mind so in case we forgot a point, we have it written on the summary sheet.* (P6-14-mba)

*The summary sheet helped…us not need to memorize…I can do a closed-book test but would not let go of the summary sheet. It lessened our stress.* (A1-1-bsc)

Another reason found reducing stress during the TBTs was the *shared responsibility* among the test team members. Students from both degree levels expressed that working with a team where the workload is shared evenly among its members gave way to a better and even fun learning experience:

*We managed to distribute the work among us. Some were reading the questions, some searching through the papers we had prepared[…]All this reduced stress during the TBT.* (Y15-12-mba)

*You get to carry part of the responsibility as you won't be solving the test only for your own grade, you will have to make sure your effort helps the whole team to achieve a good grade*. (P6-14-mba)

*Because I had my colleagues with me, this made me calm and not worry as we each answered questions which we knew the answers to*. (I9-2-bsc)

*We had fun doing the TBT because we had fun arguing to solve problems and so learning became more fun*. (C3-7-bsc)

*Time-management* is another test stress-reducing factor as noted by the interviewed students. Because of the coordination and sharing of workload, the test teams were able to manage their time more effectively:

*One of the key reasons to reduce stress is time-management and a TBT is the best test setting to learn time management.* (K1-5-mba)

*We each took a part of the test to work on during the limited time,…so, we became committed to completing our tasks.* (G7-6-bsc)

In addition, the *IFF* provided by the course instructor during the TBTs contributed to both stress reduction and the enrichment of the students' learning experience during the test:

*IFF I think is better than post-test feedback. Our understanding is still fresh during the TBT and is a good chance to adjust and edit our answers and clear any misunderstandings which leads to a better learning experience, and this is not there in the individual tests*. (T10-13-mba)

*The IFF reassures me about my own and my team's performance in the test. Otherwise, how will I know what I did in terms of performance? The IFF helped clarify the test case and course topics. And it helped in broadening our spectrum of understanding.* (A1-1-bsc)

Interestingly, the findings revealed that the *IFF* was also the main cause for reducing stress after the test. This, as admitted by the students, was due to clearing all misunderstandings which led to increased confidence in achieving "good" grades:

*There was no stress after the TBT because we already knew that we did well as we corrected our mistakes during the test especially due to the IFF. In regular tests, even when we compare our answers after the test, we would still not be sure if we had answered right.* (N4-3-mba)

*Post-test feedback causes too much fear because you don't know what marks you will get. IFF helps solve problems immediately and you learn the answers to the problem, and you are confident and submit without worrying about the grade*

*you will get[…]If it was not for the IFF, we would have gotten low grades.* (C3-7-bsc)

Furthermore, "academic matters" like *better grades*, *elimination of the need to cheat*, *limiting freeriding*, and *helping with final exams*; together with "teamwork skills" (RQ2): *collaboration* and *self-directed team learning,* were all found to contribute to the reduction in students' test stress. Therefore connecting "academic matters" and "teamwork skills" to "reduced stress" is shown in Figure (1).

*5.2 Academic matters*

One of the "academic matters" which students found beneficial about the TBTs was that they *limited freeriding*. Students were able to balance the teams' workload during TBT. Furthermore, students contributed the *limited-freeriding* to having less than five members on the project team during the tests:

*We allocated tasks to each member so that no body sits back, plus sharing our feedback to each other required that everybody participates so that we can decide which answers were best to put in the test paper*. (K1-5-mba)

*If we were four or more members, I would think to myself: 'if I don't study for the test, am sure the rest of the team will study and will cover for me'. But if we are less, there will be no chance to not prepare and depend on the rest of the members.* (P6-14-mba)

*If you have more than four members, you get freeriding.* (C3-7-bsc)

Interestingly, reduced freeriding among the MBA students seemed to be associated with a sense of responsibility and an aspiration to learn, while undergraduates' cooperation during the test was mostly targeted at achieving better grades (see also Table (1)):

*As MBA students, we are aware of the size of responsibility we are given to manage the TBT so the rate of freeriding will be so much less than BSc.* (P6-14-mba)

*Master students don't do freeriding…we want the degree because it helps develop our way of thinking and knowledge and skills, not because we want to get a job or just be promoted. We are more mature, so we aim to gain skills…we all work sincerely together and cooperate…during the TBT*. (N4-3-mba)

*The problem with TBT is that some people just get away with it and get the same grade as the team members who contributed.* (C3-7-bsc)

*With the free riders, we encouraged them to participate…it was useless with some of them, but we had to go on and finish the test so as not to compromise our grades.* (A1-1-bsc)

Another academic matter during the TBTs was the *eliminated need for cheating*:

*The word cheating does not make sense in TBT. It has no meaning, I cannot relate*. (K1-5-mba)

The *summary-sheet* was reported by the students as a main contributor to eliminating cheating:

*The summary sheet gave us more confidence…so in case we forgot a point we have it written on the summary sheet…it just gives us confidence and avoidance of the need to cheat.* (P6-14-mba)

A second reason for eliminating cheating according to the participating students was the *course design*. The MBA students mostly appreciated this:

*The course design is based on…class workshops where we did case analysis, literature reviews, and team course projects helped us learn how to search, site, and list references and this helped reduce stress and eliminate the need for cheating out of desperation during the TBT.* (T10-13-mba)

The *pre-sent test case* as well as the limited test time were also reasons for eliminating cheating and instead motivated students to prepare notes by speculating the test questions which gave a sense of confidence and relief. Students found it easier to depend on their notes than to waste their time and energy on cheating:

*Students can use chatbots, but these are not accurate or dependable, and we must spend time making sure the answers are accurate. That's why I prefer to receive the case and prepare my notes with my team before the test, and so be more confident.* (Y15-12-mba)

Furthermore, feeling responsible while working together as a team also contributed to eliminating cheating:

*There was no cheating because each student became responsible for his part and too busy to think of cheating, so we asked each other for help instead. As for chatbots…some use it to help them understand not cheat.* (G7-6-bsc)

The opportunity for getting *better grades* and *helping with final exams* are "academic matters" that students believed had an impact after the TBTs. While *helping with final exams* was a common attribute mentioned by students from both degrees, *better grades* was again mostly an undergraduate concern:

*During the final exam, I still remembered the comments my colleagues gave during the TBT.* (P6-14-mba)

*The TBT helped me learn how to read the case article and analyze it. And so, it became easier for me during the final exam.* (E5-10-bsc)

*We collectively discussed each answer to make sure each answer is at the best possible level, so we collectively got better grades*. (I9-2-bsc)

In addition to reducing test stress, "academic matters" also contributed to students' "teamwork skills" (RQ2):

*If a team member for example could not catch up with the preparation for any personal reason, we would help explain and teach them so that during the TBT they would…cooperate instead of freeriding[…]and each team will be busy…so there will be no chance to cheat or even to talk to the other teams.* (P6-14-mba)

*Sharing our thoughts and ideas during the TBT…lead to better grades.* (A1-1-bsc)

*5.3 Prepare for workplace*

The participating students from both degrees identified a third key subtheme, "prepare for the workplace". This was closely linked to "Teamwork skills" (RQ2) as students noted that the TBTs simulated the workplace environment, especially the teamwork as they learned how to coordinate tasks, collaborate, and adapt to different opinions and ideas during the tests:

*We learned how to work things out together. We had different opinions and styles of answering and thinking which is like the work world. So, we learned to accept, adapt, and cope with each other.* (V12-8-mba)

*The TBT is good practice…so if you work in a team in the future, you will know how to behave.* (H8-9-bsc)

*We were working on the tasks together, cooperating, as if we were in the workplace.* (A1-1-bsc)

One MBA student pointed out three reasons she thought caused the TBTs to be a suitable practice for the workplace:

*The TBT required 'good challenges'. For example, [1] the questions were unknown till the exam date, [2] also we had limited time [3] and we had to adapt as a team. So, as a result, the TBT helped us progress and learn. And this is what the workplace is like.* (Y15-12-mba)

*RQ2. How do undergraduate and graduate Gen-Z business students perceive their experience of teamwork skills development during TBTs?*

*5.4 Teamwork skills*

Receiving the TBT case four days prior encouraged teamwork which students linked to "reduced stress":

*The team support and cooperation before the TBT reduced my stress levels and made me feel like I was going to attend a regular class*, *not a test. I knew we had each other's backs. If one of us gets stuck the others will help clarify things.* (N4-3-mba)

*[during the test] the TBT increased our sense of responsibility when sharing information. We gave each other a part of the test to work on during the limited time of the TBT so we became committed to completing our tasks.* (G7-6-bsc)

"Teamwork skills" were expressed through two subthemes: *collaboration* and *self-directed learning* (SDL) which were viewed by students to have helped them *prepare-for-the-workplace.* For example, *collaboration* among students appeared when expressing *different viewpoints* and through *discussion of ideas and brainstorming* both before and during the TBTs. The TBTs helped students appreciate different viewpoints and learn how to utilize them during team discussions and brainstorming in answering the test questions:

*We had to accept each other's differences[…]At work*, *I don't usually listen to others' opinions[…]The TBT experience helped me understand that my work colleagues…want me to learn, that's why they gave me those comments[...]I feel the shift in my behavior after the TBT experience because I now listen to my colleagues and go to them for advice.* (V12-8-mba)

*TBT encouraged new ideas to come up. Each student approached the question from a different point of view*. (A1-1-bsc)

*We all worked together as a team and did some sort of brainstorming…brainstorming is one of the best techniques for people who are learning from each other.* (E5-10-bsc)

As for *SDL*, students believed it prepares them for team-based work environments:

*We distributed the tasks and each one of us studied and prepared one part then explained it to the rest of the team. So, it was like each one of us was a learner and a teacher.* (P6-14-mba)

Furthermore, *SDL* was expressed by students when describing their *problem-solving* skills. Project teams would meet before the test to analyze the test case and speculate the test questions. This attribute continued during the TBT:

*Our team met two days ahead of the TBT and made a good test case analysis together…and applied all techniques used during the course. This helped us speculate what questions will come during the test and made us fully relaxed and assured that we will do good[...]During the TBT, everyone would explain what he understood from the question and then we would answer accordingly.* (R8-11-mba)

*In a TBT, the collective creativity of all team members put together will produce answers which you cannot believe come from students, as the answers are so good!* (E5-10-bsc)

In addition, SDL helped students develop *time-management* skills which simultaneously reduced their test stress during the TBT:

*We were able to do time allocation by giving a time frame for answering each…question. We were able to allocate more time to questions which needed more discussions…while less time to straightforward questions…One of the key reasons to reducing stress is time management and a TBT is the best setting to learn time management.* (K1-5-mba)

*Together we were able to answer all questions on time. As a team, we did not lose track of time.* (E5-10-bsc)

*RQ3. What are undergraduate and graduate Gen-Z business students' expectations of an ideal TBFE design?*

*5.5 The proposed TBFE design*

One of the key findings from the first thematic map was that the students' teamwork experience spanned through the whole semester where they worked together as course project teams during class workshops, then prepared for the TBTs, and finally during the tests. This finding has contributed to the proposed TBFE design presented in Figure (2). Data analysis of students' expressed expectations of an ideal "TBFE Design" revealed two key subthemes, expectations *before* and *during* the TBTs.

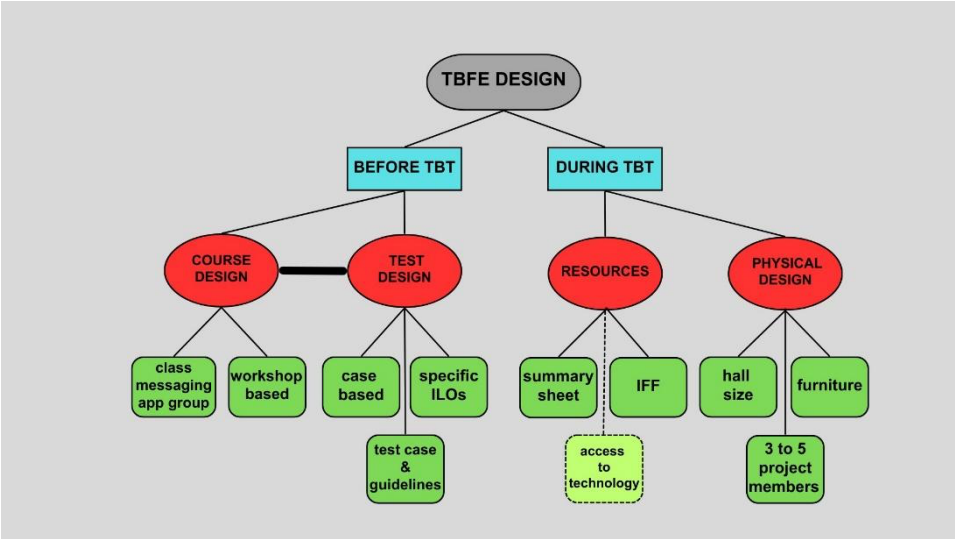



**Fig. 2:** Thematic Map-2. The proposed TBFE design

*5.5.1 Before TBT*

Another key finding in this study is that students from both degree levels considered the TBT as part of an inseparable "set". They stated that the specific *course design* was behind the success of the TBTs. This "set" relationship between the course and the test design is shown in Figure (2) as a bold line linking the two themes, *course design* and *test design*. Mainly, the course's *class messaging app group* and *workshop-based design* caused the development of students' teamwork skills and prepared them for the TBTs. The *class messaging app group* (in this case WhatsApp group) was formed in the first week of the semester. All correspondence between students registered in each course and the course instructor was made through this application. These included guidelines on workshops, tests, and projects, links to online resources, and

relevant announcements concerning the course content or schedules. Students also used this app to discuss and negotiate matters related to their course assessments and project teams. Other WhatsApp groups were also formed by each course project team to facilitate discussions concerning their project topics. In addition, the course's *workshop-based design* was regarded by the participants as a simulation of the TBTs as the class workshops helped them adapt to their teammates and learn how to manage the tasks allocated to them before the test:

*The very well-organized course design and management through the class WhatsApp groups and the weekly agenda and guidelines were all connected to each other and sent on a weekly basis. So, we knew in every class workshop what to prepare and where to find the resources…Everything was clear, structured, and organized for us. This helped us perform faster and learn to organize and delegate the tasks among the team during the TBT…so, I think this is the main reason for the success of the TBT.* (T10-13-mba)

*[before the TBT] we discussed in our project team WhatsApp group and each of us prepared three reference articles and prepared part of the summary sheet…which made it more convenient during the TBT.* (K1-5-mba)

*Even the style of the course for example the most fun system of workshop-based classes, it helps sustain the information plus increases the challenge between students like the workplace system[...]During the TBT, as I was solving the questions, I recalled workshop activities and discussions we had in class[…]I was able to speculate what questions will come in the TBT due to the workshops.* (G7-6-bsc)

As for the *tests design*, students noted that the TBT, being mainly a *case-based* test, had focused on developing *specific-ILOs* such as research skills, problem-solving, analytic skills, creative thinking, communication skills, and teamwork. Therefore, students suggested that TBTs be applied to courses that encourage the sharing of different viewpoints, enhance creative problem-solving skills, and focus on assessing students' understanding of the course content:

*All theory-based courses can have TBT but, those with calculations like accounting and finance which are based on fixed solutions have limited room for critical analysis and debating, so TBTs cannot be applied to them[...]Courses like marketing, management, and even a part of economics require that students give their perspectives and viewpoints. So, if you can be creative in your answers, you can apply TBT.* (P6-14-mba)

*We were working on preparing the answers as consultants. In such positions, you must collect a lot of evidence and do data analysis.* (Y15-12-mba)

*Courses depending on problem solving, communication, analysis, and creativity, need TBTs.* (R8-11-mba)

*I prefer that tests depending on long cases or articles to be team-based […]Questions based on analysis which are not straightforward…should be team-based.* (E5-10-bsc)

Also, students considered the *test case and guidelines* having been sent four days before the test date as a reason for enhancing their teamwork skills and their success in the TBTs:

*Because the case was sent four days before the TBT date, it made us feel like we had a deadline to deal with so, we prepared a time schedule and did the research and prepared the summary sheet. This also helped us write more professionally during the exam and to…contribute our ideas referencing…literature we [collected] during those four days.* (T10-13-mba)

*5.5.2 During TBT*

Data analysis showed that the *Resources* allowed for students to use during the tests together with the *physical design* of the test venue contributed to the success of the TBTs and therefore have been considered as part of the proposed TBFE design. Three themes emerged under *resources*. These are: *summary-sheets*, the course instructor's *IFF*, and *access to technology*, namely the internet, through mobile phones and other devices. As shown earlier, the *summary sheets* and *IFFs* had a pivotal role in reducing students' test stress and helping focus on the application of the tests' ILOs. Therefore, these two elements have been integrated into the proposed TBFE design:

*The notes in the summary sheet can be based on students' speculation of what will come in the final and based on reading the case, which will…ease answering the TBFE questions.* (E5-10-bsc)

*I want the IFF! It reassures me about my own and my team's performance in the test[...]The IFF helped clarify the test case and course topics and broaden our spectrum of understanding.* (A1-1-bsc)

*Access to technology* is presented with dotted lines in Figure (2). This is because a considerable divide appeared between perceptions of MBA and BSc students. While the graduate students believed that it would help them gain time and train on ethical conduct through trust and professionalism like in the workplace, undergraduates expressed their willingness to let

go of this luxury in return for keeping the *summary sheets* mainly to avoid cheating:

*As master students…we won't conduct unethical behavior such as cheating while using technology during the TBT; as in the end, it is us who will benefit by gaining skills and knowledge which we will then be applying in our workplace[…]But if you cheat you will never progress in your career, job, or personal life.* (R8-11-mba)

*Allowing only summary sheets without access to the net would be a good thing because there will be trust between us and the Dr, so the Dr will not doubt us to be cheating since with the mobile phone it is easy to just access Google and get answers.* (H8-9-bsc)

The *physical design* of the TBFE venue was defined by the students through three attributes. These are coded as *3to5 project members, hall size,* and *furniture* in Figure (2). Students repetitively highlighted that the TBFE team's size ranges between three to five members and consists of the same members who worked together on the course project and during the class workshops. Students believed that this helped with better exam time management, caused a fairer work distribution hence avoiding freeriding both before and during the TBT, and eased adapting to one another; all of which contributed positively to their test performance:

*The ideal number in a TBT is 3 members. Because with 3 members the TBT experience would be more fair as each member will be responsible for a significant number of topics to review which will eliminate freeriding[…]Even studying together as a team before the TBT will be easier to manage and more beneficial[…]It is important to have the same course project team members together during the TBT as we all know each other's skills, abilities, and strengths.* (P6-14-mba)

*3 to 5 members are enough. 6 might be too much because more ideas will pop up per question so it will be hard for a team to settle on one answer during a limited time.* (E5-10-bsc)

The exam *hall size* and *furniture* were described to preferably be large enough to accommodate all examining teams in a way that would not cause any disturbance and that there be a central table for each team in case of needing to use computer devices or write on a common test answer sheet:

*The test should be in a large spacious place like the theatre with tables and chairs for each team and the tables should be far from each other.* (Z11-4-bsc)

One of the MBA courses did their piloted TBT in the university cafeteria as it was conveniently empty at the time. Students stated that the venue contributed to reducing their test stress unlike traditional exam halls:

*We did the TBT in the cafeteria; the place made us feel comfortable as it was spacious and did not give us the feeling of an exam. Whenever the other teams had a discussion, we were not disturbed…having a table in the middle is better because the class chairs are not comfortable.* (Y15-12-mba)

*5.6 Statistical data analysis*

The mean value of CILO clusters (knowledge and understanding, subject-specific skills, critical thinking skills, and general and transferable skills) was compared across all four undergraduate and two graduate courses both with and without TBTs. Introducing TBTs to these courses had a positive effect, particularly for undergraduate students. Table (3) shows an average increase of four percent (84% to 88%) in student grades for all four CILO clusters. Interestingly, however, there was no apparent difference in CILOs' mean values between MBA students' grades whether with or without TBTs. The reason for this is due to the intensity of team-based assessments within the two MBA courses apart from the TBTs where team-based course projects, weekly workshop assignments, and group presentations have been conducted before TBTs were introduced and therefore have apparently contributed to enhancing MBA students' learning outcomes. Figure (3) presents a graphical illustration of this comparison.

**Table 3:** Mean values per individual CILOs and CILO clusters across all 6 undergraduate and MBA courses

| ILO Cluster | ILO | ILO Name | mean per ILO Undergrad courses | | mean per ILO MBA courses | | Avg per ILO cluster Undergrad courses | | Avg per ILO cluster MBA courses | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | no TBT | TBT | no TBT | TBT | no TBT | with TBT | no TBT | with TBT |
| **A** Knowledge and understanding | A1 | Concepts and theories | 76 | 86 | 96 | 94 | 83 | 86 | 96 | 96 |
| | A2 | Research skills | 87 | 87 | 92 | 93 | | | | |
| | A3 | Professional responsibility | 86 | 86 | 100 | 100 | | | | |
| **B** | B1 | Problem solving | 85 | 90 | 87 | 85 | 84 | 87 | 90 | 88 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subject-specific skills | B2 | Modelling and design | (B2 Not Applicable here) | | | | | | | |
| | B3 | Application of methods and tools | 82 | 84 | 93 | 91 | | | | |
| **C** Critical thinking skills | C1 | Analytic skills | 81 | 84 | 91 | 88 | 80 | 85 | 93 | 91 |
| | C2 | Synthetic thinking | 80 | 89 | 97 | 93 | | | | |
| | C3 | Creative thinking and innovation | 81 | 83 | 93 | 91 | | | | |
| **D** General and transferable skills | D1 | Communication skills | 91 | 91 | 95 | 93 | 90 | 93 | 94 | 92 |
| | D2 | Teamwork and leadership | 88 | 91 | 94 | 96 | | | | |
| | D3 | Organizational skills | 96 | 97 | 100 | 97 | | | | |
| | D4 | Ethics and social responsibility | 85 | 93 | 88 | 82 | | | | |
| | | | | | | | **84** | **88** | **93** | **92** |

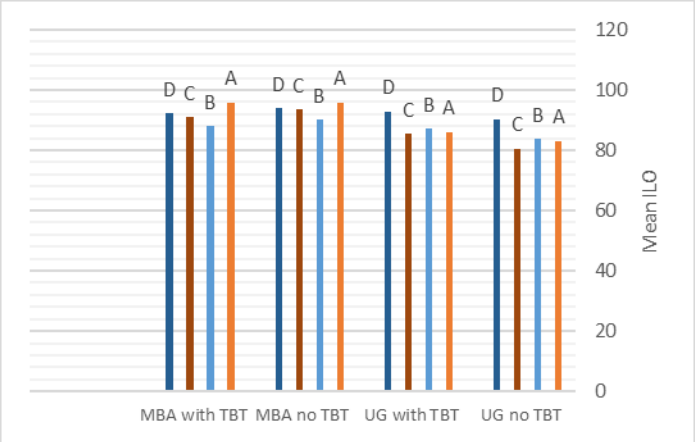



**Fig. 3:** Graphical illustration of changes in mean values of ILO clusters A, B, C, and D for undergrad (UG) and MBA

## 6 Discussion

This research has utilized the results of a two-stage study to propose a TBFE design to the limited body of knowledge in business education. In terms of answering the research questions, regarding the perceptions of Gen-Z business students of TBTs (RQ1) and their experience of teamwork skills development during TBTs (RQ2), this research findings concur with prior literature in that TBTs collaborative learning environment significantly minimize test stress (Ibrahim *et al*., 2023; Reinig *et al*., 2014; Şişman *et al*., 2018) and simultaneously facilitate the development of a particular set of teamwork skills such as collaboration (Creo *et al*., 2021; Ibrahim *et al*., 2023; Şişman *et al*., 2018; Tsai *et al*., 2023) which includes shared responsibility, ideas, and viewpoints, within a brainstorming like meeting (Brock *et al*., 2017), as well as self-directed team learning (Woezik *et al*., 2021) which in-turn includes self-directed problem solving (Tsai *et al*., 2023) and time management (Augar *et al.,* 2016). Moreover, this research adds that students' stress reduction is not only bound to the duration of the tests but spans through two other points in time, namely before and after the TBT. As perceived by the business students, the reduced stress formed a reciprocal relationship with an array of factors which are only partially covered in prior research. One factor causing reduced stress before the TBT is the workshop-based course design which familiarized students with teamwork and with their course project teammates during the weeks before the TBTs causing team members to work agreeably with one another during the team tests (Francis *et al*., 2025; Heber *et al*., 2024; Riebe *et al*., 2010; Reinig *et al*., 2014). Another factor is students receiving the test guidelines and case before the TBT date (Francis *et al*., 2025). Uplifted students' moods during the test were caused by their shared responsibility, collaborative self-directed teamwork, not needing to memorize and instead becoming more aware of and better understanding the subject area (Khansari and Coyne, 2018), being allowed summary sheets or access to technology in the exam hall which consequentially eliminated the need to cheat (Eldakhakhny *et al*., 2024). In addition, the reduced number of team members limited freeriding and reduced test stress during TBTs (Ramdeo *et al.*, 2022). Lowered stress after the TBTs was caused by both the students' notion of getting better grades when working with a team (Stark, 2006; Tejada *et al*., 2016) and the instructor's IFFs during the test (Schmulian and Coetzee, 2019; Schneider *et al*., 2018) which in turn facilitates students in estimating their grades during the TBT (Stark 2006, p.825). These findings also agree with Iorgulescu (2016) and

Schmulian and Coetzee (2019) regarding Gen-Z requiring continuous mentoring and immediate feedback. Moreover, the positive experience gained from the TBT helped not only in easing students' preparation for final exams but even in enhancing their final exam performance (Aoe *et al*., 2022; Espey, 2022; Khansari and Coyne, 2018; Şişman *et al*., 2018).

Regarding Gen-Z business students' expectations of an ideal TBFE design (RQ3), the findings indicate that TBFEs must be synchronized with a specific course design that works progressively in preparing students for such assessments. Therefore, TBFE designers must keep in mind that such assessments are an extension of the students' self-directed collaborative learning experience which begins far before the TBFE and extends to the duration of the exam. Although such a design is not prominent for final exams in business education, the role of TBTs in enhancing self-directed collaborative learning has been noted in the literature (Augar *et al.,* 2016; O'Regan *et al*., 2023; Rodríguez *et al*., 2019; Woezik *et al*., 2021). Therefore, this study proposes a workshop-based course design coupled with a class messaging-app group to maintain a sense of collaboration and shared experience before the TBFE. Furthermore, the findings indicate that such course designs work harmoniously with case-based TBT designs which, in agreement with DeRuisseau (2010), are known to enhance ILOs that are particularly soft-skills oriented. The students recognized these soft skills upon receiving the test case, which occurred several days before the test itself. This encouraged collaboration and self-directed learning as the test approached. Findings from statistical data analysis further support DeRuisseau (2010) in terms of the positive effect of TBTs on all CILOs, including teamwork and leadership, communication, and problem-solving skills, particularly for the undergraduate courses. Furthermore, the findings align with Rodríguez *et al*. (2019) research results in that TBTs allowed Gen-Z students to acquire advanced competencies in the cognitive domain of learning such as analyzing, evaluating, creating, problem-solving, and use of bibliographic sources, all while gaining the ability to work in teams in a way suitable for Gen Zers as digital natives who are prone to multitask and immediacy (Rodríguez *et al*., 2019). Furthermore, during the TBFE, summary sheets, IFFs, and access to technology could help create an experience that emulates the work environment where employees have access to all information resources when solving complex problems (Augar *et al* 2016; Eldakhakhny *et al*., 2024; Fink *et al*., 2023). Such environments, as perceived by the graduate students in this study, create a climate of trust and professionalism among team members. This is also recorded in prior research (Agbejule and Lehtineva, 2022) where students were found freely expressing their ideas without the fear of making mistakes, leading to feelings of trust and the generation of innovative ideas and consequentially enhancing the teams' performance (*op cit*., p.126). Dynamic active learning designs such as the proposed TBFE echoes Espey's (2022) findings in that collaborative team-based learning causes significant gains not possible through individual assessments.

Concerns brought up by Augar *et al*. (2016), Baviera *et al*. (2022), and Riebe *et al*. (2010) regarding TBTs freeriding, student dissatisfaction, and unfair summative grading have been addressed by this study. Firstly, through lowering the number of students per team, preferably three to five members. This finding agrees with Rodríguez *et al*. (2019) and Stark (2006) where small TBT groups ensure both contributions by all the team members and the assessor's ability to evaluate the quality of the collaborative work. Secondly, through IFF assessment, while reducing the test's summative weight as TBTs are more soft-skills oriented and so can further students' learning through formative feedback. These findings agree with Augar *et al*. (2016) recommendation to design team assessments in a way that would embrace a balanced amount of input from each team member, and with Schmulian and Coetzee (2019) and Espey (2022) regarding the integration of formative assessment due to its contribution to learning, knowledge construction, and development of general skills expected by employers (Schmulian and Coetzee, 2019) and its significant effect on student learning beyond that measured by summative grading systems (Espey, 2022). Furthermore, the findings in this study agree with those of Schneider *et al*. (2018) and DeRuisseau (2010) relating to students' perception of IFF's role in stress reduction and increased engagement during the TBTs, in addition to their understanding due to immediate knowledge of their mistakes. Thirdly, by designing a case-based TBT and sharing the test case with students several days before the test date. Intensifying students' engagement not only eliminates freeriding but is also known to enhance the educational effectiveness of academic courses (DeShannon *et al*., 2022). Moreover, combining case-based with team-based learning has proven to encourage professional group discussions related to real problems hence further developing students' critical thinking and teamwork skills (Alsalman, 2017). Furthermore, case-based learning is known to be applied by professionals in the workplace and has proven to enhance critical employment skills such as the ability to make business decisions, collaborate, and solve practical business problems which depend on reasoning and critical analysis (Alsalman, 2017; DeShannon *et al*., 2022; Pinkus *et al*., 2015). The use of cases has recently become common practice in business management education, mainly to enhance critical thinking skills while investigating contemporary complex business cases faced by managers (Evans, 2016). Moreover, the AACSB emphasizes the necessity of using case pedagogy with real-world problems within a group project-based learning approach in all business courses as this better enhances students' leadership skills (Glass, 2022). Finally, the results imply having a spacious venue for the TBFE enough to seat each team of students around separate tables to serve the privacy and individuality of each test team.

### *6.1 Implications*

The study presents practical implications for business educators. The findings suggest that final exams should be an

extension of Gen-Zers learning experience. The proposed TBFE design may be used by business educators to prepare Gen-Z graduates for the demands of a modern work world. The findings could inform policies, guidelines, or support resources for designing TBFEs and enhance the quality of teaching, learning, and assessments within Business colleges.

Furthermore, this qualitative research provides a deeper understanding of Gen-Z business students' experience of teamwork skills development during TBTs as well as their expectations of an ideal TBFE design. Moreover, the results hint toward having formative assessment as the main method of appraising student teamwork skills like in workplace settings where collective team output counts. The results further signify that reducing students' test stress, by focusing on elements that enhance teamwork skills, can ultimately lead to the success of TBFEs and equip business students in HE with the skills needed to face the challenges of today's workplace.

*6.2 Limitations and further research*

This study depended on information from Gen-Z college students within a single private HEI. The proposed TBFE design was based on the participant's perception of intra-semester piloted TBTs hence future testing of the proposed final exam design will be essential. Moreover, further quantitative studies should be conducted to measure the impact of TBTs on enhancing teamwork skills. Multiple educational institutions including government sector business colleges should be studied in terms of compatibility of TBTs and TBFEs to different educational cultures. Furthermore, future research must explore how team-based assessments could capture students' competency levels by developing rigorous AACSB Assurance of Learning (AOL) procedures which would ensure alignment of team exams with the industry expectation for the targeted competency goals (Sheikh, 2023). Finally, further research could relate TBTs and TBFEs to additional educational skills that are relative to business education and are in line with UNSDGs.

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