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Elevate-Z: A Model to Create Learning Spaces for Generation Z Students

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***Abstract*—** We have Generation Z students who are spontaneous and ardent, stepping into college with the dreams to graduate. Most Generation-Z has used the internet since their young age, are comfortable with technology, and have an equivalent presence on social media as that of physical. Having a short attention span, they need perspectives that matter and analyses with direction. To provide a pertinent learning space to Generation Z students, this paper proposes a model - 'Elevate-Z.' Elevate-Z has four major components: Know-Z, Interpret-Z, Incubate-Z, and Be-Z, which give it a shape of Z, determined by the breadth and depth of each element. The model encompasses an iterative process yielding results and feedback periodically. The paper also puts forth the closures derived from the Elevate-Z model. The closures discussed are on feedback, challenges, prevalent, upbeat, and comprehension. The results and discussion are presented by applying the model for four courses over a span of four years for different batches. The paper further discusses the numerous methods and by-products of the model, to name a few: hundred questions challenge, honest weekly dashboards, teaching through design way, industry challenges, problem-based learning sessions, creative minor question papers, and challenging assignments. The model's effectiveness is evaluated and presented based on the attainment of course learning outcomes, student performance, and student feedback. Generation Z students need an emphasis on design and conceptual motivation rather than flat lesson delivery. Elevate-Z serves the purpose just right.

***Keywords*—** Elevate-Z; Generation Z; Learning Spaces; Learning Objectives; Model; Pedagogy

***JEET Category*—Research**

I. INTRODUCTION

THE Digital Natives or Generation Z are the ones born in the late 1990s and early 2000s. Generation-Z kids have had access to the internet since their early ages, are comfortable with technology, are internet savvy, and are active on various social media. Seemiller & Grace (2016), in their survey book 'Generation Z Goes to College,' explicate that these students self-identify as being loyal, compassionate, thoughtful, open-minded, responsible, and determined are focused on bringing innovations and inventions to change the world. They are quick, swift and as well have a short attention span. They view their peers as competitive, spontaneous, adventuresome, and curious, all characteristics that they do not see readily in themselves (Singh & Dangmei, 2016).

These kids need a handholding that is diverse, unlike the past generations. From the generation that was solely dependent on textbooks and college libraries to the generation later that visited internet café centers for resources, we have reached a cohort that has everything accessible at household and at hands reach. Even the quantity and nature of the information that is accessible has prominently increased and improved over time. The information is not only available in text format but also in various multimedia formats like videos, audios, animations, simulations, game-based, etc. The experts from around the globe and their resources are now at 'clicks' reach. In this prevailing scenario, undoubtedly, as a faculty one must rightfully ask the question, 'Should I re-structure my classroom sessions?' an alternate otherwise can also be 'Am I doing justice to the classroom sessions?'

Generation Z's, who came of age in this era, who were studied for behaviors, attitudes, and lifestyles, portrayed dramatic positive and concerning shifts (Dimock, 2019). A survey from McKinsey conducted in Brazil (Francis & Hoefel, 2018) states that 76% of Gen Zers belong to a religion but are also more liberal. The survey labels them as 'identity nomads.' Almost every country has studied its generation and analyzed the behavior. Indonesia calls them the self-driven digital (Hinduan et al., 2020). Drawing from substantial research institutes and market research firms such as Pew and Census, Seemiller & Grace (2018) have analyzed Generation Z with respect to career aspirations, educational preferences, social concerns, relationships with family and friends, health and wellness, money, and civic management, ideologies, and theories, etc. The sociology of this generation is majorly technology-influenced and has a minimal correlation with the past generation patterns. With the changed scenario, the old methods certainly stand obsolete, demanding the needful change in the education sector. The change has to begin from curriculum design, teaching and extend to the evaluation methodologies.

With due respect, it becomes a responsibility of an academician to prepare a lesson plan and deliver the lessons effectively to Generation Z and prepare oneself for the greater beyond. Considering the challenges we have at hand to understand and apply in the modern-day learning environment, this paper proposes a model: Elevate-Z. Elevate-Z is an iterative model. The paper further presents the literature

survey, model and its closures, model inferences as applied to four courses, and finally, the conclusion and future scope.

II. Literature Survey

Generation Z's are amateur internet searchers lacking skills to evaluate web content (Geck, 2007). They lack critical thinking skills, though tech-savvy (Shatto & Erwin, 2016). They are accustomed to the fast-paced world where many 'once effective and tested' foundations and theories are no longer to them (Jones et al., 2007).

Their technology and social interest have been studied (Turner, 2015). They are location-aware and speak technological languages (Cilliers, 2017). Generation Z has been researched from several perspectives. They are known as consumers of trends and innovations (Wood, 2013). Educating and engaging them is tagged as challenging (Seemiller & Grace, 2017). They have been examined to understand the contemporary learning environment (Mohr & Mohr, 2017). Their thought process is envisaged and contemplated (Törőcsik et al., 2014). Their behavior has been addressed as a tsunami of learners (Rothman, 2016).

Engineering education for Generation Z has been discussed (Moore & Frazier, 2017). The challenges of teaching them have been deliberated (Cilliers, 2017). Including nursing and medical, preparation guidelines when they walk into college have been debated (Eckleberry-Hunt et al., 2018). Teaching methods and techniques have been presented (Vikhrova, 2017). Course designs for practical learning experiences have been realized (Gardner et al., 2018). Surveys have been carried out on what Generation Z needs in education (Satrio et al., 2020). They have been called as instant generation (Loveland, 2017). Designing education applications for Generation Z have been discussed as well (Ashcroft, 2021).

Several efforts have been made to teach and tutor Generation Z kids with respect to teaching. The generation has its own characteristics and has to be indeed accounted for. The traditional teaching methods that were once effective may no longer hold interest to Generation Z kids. They are stepping into college with aspirations to graduate, talking the language of technology, influenced by entrepreneurs' thoughts, exposed to the latest hardware and software, and most importantly, to be a root of innovations. In the next section, we present our education model, Elevate-Z, catering to contemporary needs and challenges.

III. Elevate-Z Model

This section presents the design goals, research questions, principles derived from the gaps, a four-component teaching and learning model, and the closures derived from the model. The design goals were formulated based on the gaps identified in the literature survey.

A. Design Goals

The design goals of the model are as follows:

1. To comprehend the characteristics and behavior of Generation Z in order to connect from remember level to create level (with reference to Bloom's Taxonomy).
2. To derive closures and iteratively improve the process of teaching, learning, and assessment.
3. To copy the Z trends, interests, and behaviors to adapt and paste them into the learning models and resources.

B. Research Questions

For the identified design goals and the process's completeness, a survey was conducted for second, third, and final-year computer science and engineering students. The survey had one question to be answered and was completed by 312 students. Figure 1 presents the survey analysis.

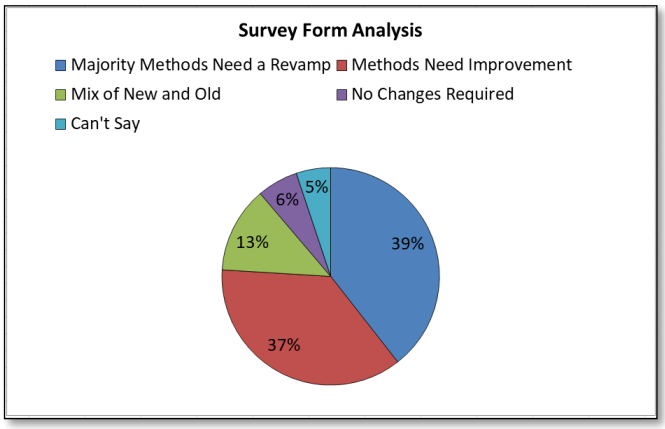

Fig. 1. Survey analysis of 312 Generation-Z students on current (years 2018 to 2020) teaching methodologies.

39% of students expressed that they needed a major revamp in the teaching methods. 37% of students felt that the existing methods needed improvement. Overall, the above statistics account for 76% of students demanding a change. Considering the survey and from the literature gaps, the research questions were formulated as follows:

1. Research Question 01: What are the classroom expectations of Generation Z? (subject to vary based on demography)
2. Research Question 02: What are the effective teaching techniques for Generation Z?

C. The Model

The four-component model can be seen in Figure 2. The model has two breadth and two depth components. The first component is Know-Z. The objective of Know-Z is to understand the collective behavior of the class. This helps the facilitator to gain a perspective of the batch. Unlike the previous generations, most Generation-Z students have their role models and influencers coming from diverse backgrounds, who help them, self-teach a worldview with a custom domain of interest. This phase can be carried out using a systematic survey form or by asking simple raise-your-hands questions in the class. The major reason to do this is to make the students aware that their interests are listened to. The second component is Interpret-Z. The objective of this is to interpret and analyze the specific behaviors of Gen-Z. This interpretation helps in planning out the class activities. All

activities essentially need not be evaluated. It also helps in writing objectives for each of the designed activities. There can be an activity designed only to make a student aware of a specific concept without evaluation.

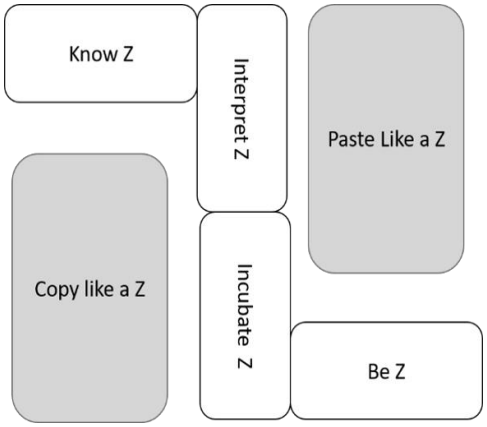

Fig. 2. Elevate-Z model with the four components: Know, Interpret, Incubate and Be.

Component three is Incubate-Z. The interpretation and analysis aids in incubating it in the next set of activities. The objective of this component is to build the lesson delivery in the most effective way conceptually. The facilitator needs to design the activities, and this set can be used for assessments. Be-Z is about being one of them. The facilitator understands and iterates the process. The new sets of activities are designed to scaffold or to meet the desired objectives. Closures discussed in the next section can be used as guidelines to design the activities.

This model was iteratively developed over a span of three years while applied for a set of four courses, a few in repeated years. The first model developed had the Incubate-Z missing. It was later added in the second iteration to make the model operative and effective.

D. Closures

A systematic study of the model over three years was carried out. The results from feedback and course learning objectives were analyzed. Following are the closures that depict the characteristics of Generation Z as distinguished from the model analysis. They are articulated from the learnings by the four components of the Elevate-Z.

1) Closure 1: Feedback

Effective feedback lies in intentions and not in the methods. Generation-Z expects quick and methodical feedback. They are curious to know the aspects of where they can improve. Instant feedback can improve their work efficiency. That said, they lose interest if the same feedback is made available a week later.

2) Closure 2: Challenges

Challenges are not obstacles. Generation Z preferred to be challenged. That said, they need to see the benefit emerging from it. The challenges need to make them aware of the unexplored. They look forward to challenges that are not available on the internet. They explore and read when a challenging solution is not readily available.

3) Closure 3: Prevalent

Prevalent is about agreeing and explaining why. Generation Z needs an explanation. They need to be explained when an objective is agreed upon and how it is relevant to real-world apprehensions. When the goals have a vision, they consider analyzing and applying their honest effort towards the task. Their interest and curiosity can be passionately increased by connecting tasks to modern-day issues and trends.

4) Closure 4: Upbeat

Upbeat, like the word echoes, we need to show them there is more. They need to be communicated that there is further beyond to be explored. They need to be put into the sea of unlimited challenges. They look for tasks that are beyond completion and conception.

5) Closure 5: Comprehension

There is a bigger picture – abstraction. Generation-Z prefers the design way. They read internet materials, but they lack basic principles. They prefer the traditional chalk and talk to the slide presentation. They need the connection between life experiences and how the concepts find relevance in day-to-day life activities.

IV. Model Analysis

This section presents the model analysis applied to four courses. The courses are Data Structures and Algorithms of III semester, Algorithmic Problem Solving and Semantic Web offered for VI semester, Model Thinking course of VII semester. Courses were selected to span the different years of engineering degree, and the same faculty handled all courses. The nature of the courses selected was different from each other, from programming to conceptual, to provide diversity for the model testing. Figure 3 presents the different phases of the model.

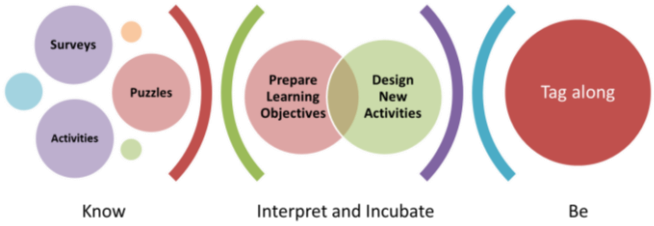

Fig. 3. The phases of Elevate-Z and its activities.

Activities are the core and focus of the Elevate-Z model. Each of the phases essentially is an activity with a specific objective. This section further elaborates on the different activities carried out for various courses.

The copy-paste part of the Elevate-Z model is a challenging phenomenon and improves with experience. An example scenario can be seen in Figure 4 relating to the course Data

Structures and Algorithms. The class was first shown a set of videos with the objective of how nature inspires algorithms. The videos were selected from the domains of the animal kingdom, sports, movies, etc. These videos were used to explain the different algorithm techniques, and each technique feature was noted. Later, the students were given paper pieces written with random numbers and were asked to sort using the understood design techniques as the base. Using the underlying thought process, sorting techniques were explained and analyzed. As shown in Figure 4, Bloom's taxonomy of L2 to L4 was achieved using the set of activities.

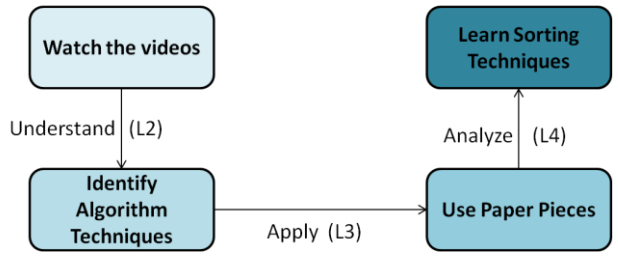

Fig. 4. Copy-paste example scenario for phases of Elevate-Z: sorting

The Algorithmic Problem Solving course had an Honest dashboard where students were color graded every week for the entire semester based on the weekly performance. The legends given were:

1. Blue: you are doing well
2. Yellow: you can get better
3. Red: don't even ask

There was an activity scheduled every week to decide the performance. The partial dashboard screenshot can be seen in Figure 5.

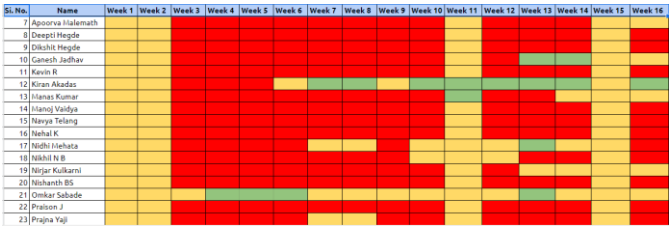

Fig. 5. Honest color graded dashboard for Algorithmic Problem Solving course.

In a survey conducted at the end of the semester, 81% of students stated that though the dashboard was not considered for evaluation, it did help them in the learning process. They expressed that weekly status feedback helped them to have a constant check. Several challenges were hosted on HackerRank platform for the course during the course tenure. Each of the challenges had different formats and requirements. As a positive effect, two students from the course reached the prestigious event from Infosys - HackWithInfy finale. This has now been a trend, a legacy, and there has been at least one student from each batch past the four years in the finale.

Gen-Z appreciates the design thinking methodology. They need to be explained on 'why' and 'how' than just the slide presentations rolling out the concepts. They need to be explained and tested on scenarios that they can connect to than the 'explain,' 'define,' or 'discuss' type of questions. A sample scenario-based question from the course Model Thinking can be seen below:

Play the game from: https://www.thegiglane.com/. It will help you understand the life of a gig worker and the design policies of the system. What changes would you like to bring to the existing model as a responsible software developer? Prepare a report that presents a model to improve working conditions.

For the course Model Thinking, the following feedback question was asked at the end of the course: Minor question paper had scenario questions based on the concepts learned in the class, rate (One being lowest and five being highest) on the effectiveness in improving the learning and problem-solving abilities. The feedback can be seen in Figure. 6.

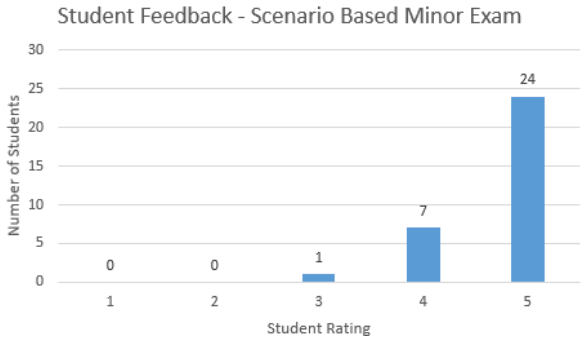

Fig. 6. Student feedback for the scenario-based minor exams for the course Model Thinking.

Generation-Z students are superhero fans. They discuss and relate about movies. They relate to sitcoms and they troll and meme. A meme assignment was given to students to create a meme using a drake meme template for the Data Structures and Algorithms course. The details can be seen in Figure 7.

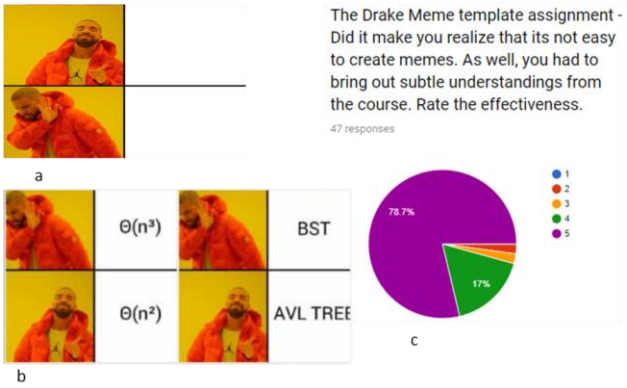

Fig. 7. (a) drake meme template; (b) student-created memes; (c) student feedback.

The course - Semantic Web had open-book exams. Several activities were attempted during the delivery of the course based on the nature of the course and the learning objectives identified. The course Data Structures and Algorithms have four divisions where one of the divisions (Division D)

employed teaching using Elevate-Z and the remaining three through traditional means where the course content across remained the same. The end semester result is presented in Table I.

TABLE I
SUMMARY OF S AND A GRADES OF 4 DIVISIONS

Division	Total Students	S Grades (91 and above)	A Grades (relative grading)
A	68	1	18
B	70	1	20
C	66	5	18
D	70	9	24

The course learning outcomes for the Semantic Web course can be seen in Table II (Hegade et al., 2021).

TABLE II
SEMANTIC WEB ATTAINMENT

CLO ID	Attainment
CLO1	2.49
CLO2	2.03
CLO3	3.0
CLO4	3.0
CLO5	3.0

Table III summarizes other activities conducted across the courses with an appropriate description of the model derivative. The table list is not exhaustive and describes varying one-of-its-kind activities.

TABLE III
ACTIVITIES LIST

Si. No.	ACTIVITY	Description
1	Design of a Programmer - ebook	Students had to read the ebook and write an essay
2	Industry Challenges	Course-related industry challenges were hosted from Knit Arena
3	100 Questions Challenge	Two challenges were conducted before each minor with 100 questions from course content, GATE, and interview questions
4	Competitive Programming	Competitive programming challenges were used from HackerRank and CodeChef platforms
5	Code Vie	Internal course challenges hosted on HackerRank
6	Problem Based Learning	Problem-based learning sessions were designed for the course Algorithmic Problem Solving, Semantic Web and Model Thinking
7	Inventory Data Structure (https://github.com/prakashbh/inventory-data-structure)	A challenge where students had to design new API's for the course faculty designed new data structure
8	Mock Minors/Handouts	Practice minors and mini-handouts provided in the class to enhance the learning
9	Class Notes and Resources	The class notes, resources, laboratory exercises, and other activities were hosted on LMS.

The activity preparation time varies based on the nature of the activity, from a few hours to a week. As the nature of the model is iterative, faculty needs to take timely feedback and improve the process in a timely fashion. The nature of the activity is also influenced by demography, class strength, faculty interest, and student background, to name a few prominent. Most of these activities are placed over a period of time and carried out in phases, a part of it every day than on a single day considering that we have a one-hour class delivery design for course delivery as per the scheduled timetable.

V. CONCLUSION AND FUTURE SCOPE

Inshorts mobile application conveys news in 60 words and has more than ten million downloads. Generation-Z prefers to keep it crisp and relevant. While most student-curated notes available on the web are misleading, at the same time, Generation Z needs the right direction to progress. Being connected to technology since birth, they don't prefer to have a lecture with a slide show but rather a set of planned activities. Elevate-Z presented a model to make their classes effective. Elevate-Z is essentially about planning a lecture session with a set of activities. Activities are iteratively improved and connected to meet the desired course learning objectives. The model is more of a guiding template than a pre-defined set of procedures, as the latter is what Generation-Z is not.

The experimentations carried out in various courses have been effective, and student feedback is positive. The future scope of this work is to prepare guiding templates for each of the phases of Elevate-Z and formalize the model with objectives and supervisory principles. Currently, the outcomes are measured with respect to course learning outcomes. The future work includes mapping and measuring the activities to program learning outcomes.

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