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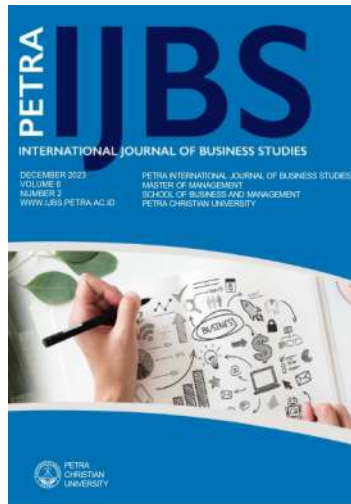
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A Thematic Analysis Exploration of Challenge-Based Learning Framework on Students of Academy X

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Abstract

Education development has grown to accommodate various teaching and learning styles in recent years. Challenge-Based Learning, or CBL, is a learning framework conceptualized in 2006 at Apple's Classroom of Tomorrow Today that is built from the natural learning process of human beings. It recognizes that everyone comes equipped with their skills, knowledge, and interests, which opens the possibility for collaboration and teamwork across various knowledge and skill backgrounds. Academy X is an institution that builds its curriculum and activity on the foundation of challenge-based learning. One of the purposes of the Academy is to increase the employability level of the students after they graduate. This study uses Thematic Analysis of interview results with Academy students to see how the CBL process in the Academy is encouraging students to grow and become more successful even after the Academy, especially in facing their careers. In summary, this study confirms through the interview of 10 Academy students how the Challenge-Based Learning drives the development of Growth Mindset in terms of Professional capacity and Personal Development despite the existence of Hindrances along the way. As such, CBL facilitates students' growth and development at the Academy for their future careers.

Keywords: application development, challenge-based learning, growth mindset, qualitative data analysis, thematic analysis.

1. Introduction

Education development has grown to accommodate various teaching and learning styles. Some examples of this would be project-based learning and computer-based learning, as well as specific learning frameworks such as entrepreneurial, design thinking, and computational thinking. However, one thing is similar across all these teaching modalities: how knowledge is passed down from a teacher to a set of students in a class setting or something similar (Johnson et al., 2009).

Challenge-based Learning, also known as CBL, is a learning framework conceptualized in 2006 at Apple's Classroom of Tomorrow Today as a learning framework built from the natural learning process of human beings. The idea is the learner's agency and freedom to choose the challenge to be undertaken, which will then include the learning process that must be undertaken to answer the selected challenge. In CBL, there is no clear definition of teacher and student because everybody is both a teacher and a student at any given time, as everyone will have something to share and teach others and also an equal opportunity to learn from the knowledge of others (Nichols et al., 2016).

The framework recognizes that everyone comes equipped with their own set of skills, knowledge, and interests (Nichols et al., 2016). This opens the possibility for collaboration and teamwork across various knowledge and skill backgrounds. Therefore, everyone within the CBL framework is called learners. However, the more experienced learners are called senior learners, parallel to our traditional education mentors or teachers, and new learners are called Junior learners, similar to students or mentees.

The Academy X is one of the most prominent, if not the only, institutions that builds its curriculum and activity on the foundation of challenge-based learning. The academy being studied is in Surabaya and has 100 participants or junior learners every year to undergo a 10-month-long program. Within this program, the learners will be allowed to learn and gain deeper knowledge of technology, design, and project management. The learners' main output from this program would be a solution in the form of iOS applications for a problem faced by their communities or communities around them.

The goal of the Academy is thus threefold. First, it will equip its students with the skill sets and knowledge to be competitive in the workforce as a world-class developer specializing in the Apple iOS ecosystem and the general app development process. The second is to contribute to the national economy by enriching the future workforce with digital know-how and work experience, encouraging the growth of Indonesia's digital industry and economy. Third,

to become an academic environment based on the values of Challenge-based Learning that was developed from the principles of Apple's Classrooms of Tomorrow - Today (ACOT2) to enable students to explore further possibilities and enrich themselves in technological development knowledge and skill sets (Apple Inc., 2010; Nichols et al., 2016; Nichols & Cator, 2008).

This project aims to see how the CBL process in the Academy is encouraging students to grow and become more successful even after the Academy, especially in facing their careers. To keep improving the implementation of CBL in the Academy, this consultative project is designed (1) to see which aspect out of the three aspects of the CBL framework (engage, investigate, act) is seen as more impactful by the students and to build upon this perspective to improve the learning process for future cohorts. It is also essential (2) to see which phase is effective in triggering the development of a growth mindset so future CBL iterations may improve upon or build around this impactful phase (3) to help students focus on their strengths and improve upon their weaknesses.

It is also the researcher's intention to be able to produce an overview of interactions between senior learners and Junior learners to illustrate the ideal interaction between them as was expected by the junior learners. In short, the researcher hopes that this project may help the Academy become better at learning, more intimate in the relationships built within, and more successful in the workforce outside of the Academy.

On the other hand, the researcher also hopes that this project may become a good foundation for introducing challenge-based learning as a framework that other institutions can easily utilize. The researcher believes that challenge-based learning is a handy and versatile educational tool. Therefore, allowing other institutions to focus on other fields or cater to the needs of other communities to see what CBL can do for our learners will be indispensable in investing in our future graduates' knowledge, skills, and employability.

Theoretically, not much research has been done on implementing CBL in learning institutions. Additionally, research on how the learners perceive the framework's effect is even rarer. This project may be one of its kind that performs a qualitative study of the students' perceptions regarding the impact of the CBL framework on themselves, specifically relating to work-related skills and other relevant life skills. This project may provide insight into the thinking process of the learners and identify significant parts of the learning journey properly,

encouraging students to grow and be ready for their future careers.

The following sections will elaborate on past references cited in this article and the research methods used herein. Results of the study will follow, stipulating significant points of interest that define the study's findings. Lastly, the researcher will discuss the overall findings of the study as well as the managerial implications and limitations of this study.

2. Literature Review

2.1. Teaching and Learning Framework

Kotnour (1999) emphasizes that the learning process is necessary to accomplish a project and continuously do so, as well as improve the capabilities of the organization's individuals regarding their abilities to perform their tasks well in the projects. It is also natural that the organization supports best practices and shares them to push the entire project (and future projects) forward.

Claxton and Carr (2004) declared that education must be focused on developing young people's ability to be skillful and confident, even when faced with difficult situations. This aligns with what Fahim and Eslamdoost (2014) stated: Educators must foster students' thinking ability so they do not become inactive students who can only absorb information. They further elaborated that educators must guide the students through thinking and learning skills to cognitive skills such as "knowledge, comprehension, application, analysis, synthesis, and evaluation, followed by logical reasoning and decision making."

From the perspective of the views above, to encourage students to grow, an educational institution needs an environment that supports learning and a robust teaching structure. Thus, an institution such as the Academy must use a framework that facilitates students to develop ideas and learn new knowledge, but also, at the same time, becoming a guide to the entire process and ensuring that the students absorb the most out of the entire experience.

2.2. Challenge-Based Learning

The CBL framework itself is divided into its three phases, which are "engage", "investigate", and "act" (Apple Inc., 2010; Nichols et al., 2016). However, how the learners progress within these phases will inherently be different between challenges and between students. Therefore, this study explores how the learners effectively engaged, investigated,

and acted upon the challenge at hand and throughout the program.

CBL is a multidisciplinary approach to learning and teaching that encourages students to leverage the technology they use daily to solve real-world problems faced every day. It is noticeably different from other methods due to its collaborative and hands-on nature, encouraging students to ask good questions, dig deeper into subject area knowledge, accept and solve challenges, take action, and share their experiences (Nichols et al., 2008).

Challenge-based learning allows the students to have more say in what goes into the class work. The students will contribute to shaping the coursework following what they perceive as significantly directed to solving the world's problem or, at least, the problem they are determined to solve at that moment. The availability of access to technology and information, accompanied by the freedom to collaborate and self-management of time, creates a very engaging learning environment with teachers positioned in a vital role as supporters of the students' cause (Johnson et al., 2009).

Challenge-Based Learning consists of three interconnected and interflowing main activities, "Engage", "Investigate", and "Act", as shown in Figure 2.1. The idea is that each student must first be engaged with the challenge at hand and explore all aspects surrounding the challenge itself to be able to conduct proper research and collect as much useful information as possible before finally executing their solution plan. These are the main differentiators between CBL and other learning methodologies, in which every idea is naturally explored based on each learner's response to the challenge itself as shown in Figure 1.

Figure 1. Challenge-based learning

1. "Engage" is the phase in which learners generate an actionable challenge from the initial big idea presented to (and adopted by) them. The CBL framework thus gives students the freedom to focus their attention and invest their time based on their curiosity and desire to learn more about a topic (Johnson et al., 2009; Johnson, 2011).

2. "Investigate" is where learners build upon the challenge formulated in the previous phase. Learners will then create guiding questions and join guiding activities or access guiding resources to hone the real action they can take to refine the initial challenge. At the end of this phase, learners should be able to synthesize a summative solution to a refined challenge that they will act upon (Nichols et al., 2016.)

3. The "Act" phase completes one cycle of Challenge-Based Learning and this is where learners develop evidence-based solutions and implement said solutions to an audience to receive constructive feedback. Reviews and feedback are crucial in this phase, as they are the ideal way to ensure the solution is impactful and effective (Nichols et al., 2016).

As the three phases are a cycle, it is also important to note that completing the act phase does not necessarily mean the end of the process. Learners often reiterate their cycle, refocusing on different aspects of the same challenge, one that may not have been addressed previously or even one they stumbled upon during the later phases. It is also possible for learners to follow a spin-off CBL cycle, in which each cycle would represent a distinct challenge that the students will address (Nichols, n.d.).

It is important to note that the essential experience of implementing CBL lies in the students being a part of a team throughout the project, accompanied by a mentor figure. The freedom of self-expression and opinion-sharing, as well as disagreements and celebration of various ideas on differing levels of complexity, become the core motivator for the students (Yang et al., 2018). The CBL framework approach itself also encouraged students to be more adaptive, engaged, and familiar with risks (Yang et al., 2018) in their lives and in their future careers.

2.3. Growth Mindset

Considering that the Challenge-Based Learning framework used in the Academy is in line with the idea of ideal teaching and learning mentioned by Fahim et al. (2014) and Claxton et al. (2004), it is expected that Academy students and graduates are thus able to achieve optimal potential, especially regarding their learning ability, thinking ability, and their resourcefulness in adversity. This ability to

constantly grow and develop further despite challenges or problems is a growth mindset.

Dweck (2016) declared a growth mindset is how an individual sees himself as having the potential to change who they are, specifically intellectually, with the connotation of such change being in the form of growth. She also stated that this same concept applies to other aspects of one's life, such as artistic talent, sports ability, or business skills. She even went further by saying that doing things differently, and arguably better, will improve the quality and performance of an individual, but the individual remains the same. In her book, she also mentioned that the Growth Mindset can benefit individuals dealing with personal development, improvement, or challenges and those undergoing education and fighting against stereotypes.

This study is interested in finding out how the students grow throughout the academy regardless of its manifestation, as this is the core of the growth mindset, and this is also what has been reported to have manifested in Academy students in the past: the ability to constantly embrace the opportunity and potential of growth, both in life and at work.

2.4. Relationship between Challenge – Based Learning and Growth Mindset

Yeager and Dweck (2012) stated that fixed and growth mindsets also influence students' resilience inside and outside the classroom. This includes how students' mindsets play a huge role in their ability to remain on top in many life situations, as well as being able to react positively, resolve conflicts peacefully, and exert greater effort in the face of adversity (Masten, 2001; Yeager & Dweck, 2012).

The selfsame growth mindset also plays a crucial role in the workplace as it is fundamental for an individual's ability to manipulate and conceptualize strategies, especially those related to leadership (Dweck, 2016; Sullivan & Page, 2020). Sullivan et al. (2020) also emphasized that the ability to self-reflect and choose appropriate strategies to achieve desirable goals is crucial in developing a growth mindset. This is in line with what is stated by Dennis (2016) in his paper "Cultivating a Growth Mindset for Effective Adaptation in Today's Dynamic Workplace", in which a growth mindset is crucial for the development of risk-taking and problem-solving skills for the modern-day workplace.

Since Challenge-Based Learning is a framework that allows students to explore and develop their abilities concerning the life situation they are facing

(a challenge) through the guidance of a mentor who helps students maintain their positive attitude regarding learning and growth, then it can be stated that CBL develops Growth Mindset in Academy students. Since CBL gives students enough space to be creative and self-directed (Nichols & Cator, 2008), each CBL phase should contribute to developing students' Growth Mindset. Therefore, this study is directed to see how the students of Academy X perceive the CBL framework implemented in the Academy in developing their growth mindset and preparing them to be resourceful and capable in their future careers.

3. Methods

This project aims to understand how students of Academy X perceive their learning journey using the CBL approach and how they perceive the CBL in helping them develop precious life and career skills. To obtain relevant data from the informants, the following are the research questions of this study, accompanied by the interview questions in corresponding columns. The questions will help the researcher understand how the students experience Challenge-Based Learning during and after the Academy. This line of questioning is modeled after the study by Fox (2015) on the effect of centering prayer on monks living in a convent. The interview revolves around several central research questions, in this case relating to aspects and perceived effects of CBL on Academy students. These are then expanded to more specific interview questions designed to direct the flow of communication towards coaxing the interviewees into appropriate perspectives regarding their CBL learning journey.

3.1. Informants and Demographics

The population of the study is the Academy's 2022 batch, 101 students with the following demographic: 71 participants are male while 30 are female. They are grouped into three specializations: technology, design, and domain experts, with the following proportions: 70, 20, and 11 participants, respectively. To elaborate further, there are nine females in technology specialization, 13 in design specialization, and 8 in domain expert specialization.

The researcher used purposive sampling to determine the number of informants for this study. Purposive sampling is used to select individuals from the population who meet certain criteria required in the study (Etikan, 2016). Etikan (2016) also states

that the purposive sampling method, such as this study, is commonly used in qualitative studies. Cresswell (2018) mentioned that for a phenomenology qualitative PhD study, the sample size should be between five and twenty-five respondents or informants. Morse (1994), however, suggested at least six respondents for such research.

However, Mason (2010) declared that qualitative researchers tend to use the number of informant suggestions as guidelines while they should also consider the saturation of insights gathered in the process. Saturation is identifiable by the diminishing returns of the amount of data gathered. In other words, the researcher might achieve saturation after interviewing fewer respondents. Hence, the number of informants below is determined as the minimum number to be interviewed, and more may be added if the process has not yet reached a point of data saturation.

Table 1. Research questions

Research Question	Interview Question	Purpose
How does the "Engage" Phase of CBL help students in Academy X determine what direction their project should go concerning the challenge faced?	1. How did the Big Idea help you decide what project to undertake? 2. How did you find out about the options you have regarding your project? 3. What is your basis in defining your Challenge?	To help the interviewee identify their thought processes at the beginning of a project, including refining their initial idea and determining the course of action.
How does the "Investigate" Phase of CBL help students in Academy X to enrich their skills and knowledge in anticipation of meeting the challenges of their selected project?	1. What is your thought process in creating guiding questions? 2. How have the Guiding Activities or Guiding Resources helped you refine your challenge? 3. How do you use all the data gathered to set up the solution's foundation for the challenge?	To help students recognize their idea development process, including goal-setting, enrichment of ideas, and confirmation on selected actions in order to meet the Challenge set in the previous phase.
How does the "Act" Phase of CBL help students in Academy X determine their project's resulting impact in relevance to the challenge faced?	1. How do you plan for the creation process of your solution? 2. How do you approach the solution iterations? How do you refine your solutions? 3. How do you assess your solution? How do you decide what action to take next?	To aid the students in describing their thought processes regarding their product. Specifically, it is essential to decide whether or not the product is answering their initial problems and how they will remain so.
How does CBL impact students of Academy X to grow throughout their involvement in the academy program?	1. How different are you before the beginning of the Academy and now as you complete it? 2. What has been the most notable change for you? 3. What is your most important or impactful takeaway from the Academy?	To help students recognize their personal growth, both professionally and in life, appreciate the improvements made, and identify points for future growth.
How do Academy students perceive CBL?	1. What is your most important part in developing solutions for your challenge? 2. What is the best way to figure out how to meet challenges? 3. Is there a specific thing that you believe is crucial for the challenge solution processes in the Academy?	To help students identify which stage within the CBL implementation is significant to them, which will be useful in adapting CBL in life and at work.

3.2. Data Collection

This project's primary data are collected directly from the research subjects using a semi-structured interview approach. Data collected were then analyzed using Thematic Analysis (Braun & Clarke, 2006). The researcher recognizes that asking specific questions regarding Growth Mindset or implying that there may have been a Growth Mindset resulting from or related to the Challenge-Based Learning activity at the Academy might create a bias during the interview. Thus, the researcher shall conduct this interview without explicitly mentioning Growth Mindset, both on scripted questions and any follow-up questions that may surface.

3.3. Qualitative Data Analysis and Thematic Analysis

Miles et al. (2014) defined the Qualitative Data Analysis process in their book "Qualitative Data Analysis" as an analytical process of linguistic text based on how we as researchers interpret them according to our own experience concerning the theme. In their book, the analysis relies on 3 activity flows: data condensation, data display, and conclusion drawing, as depicted in Figure 2.
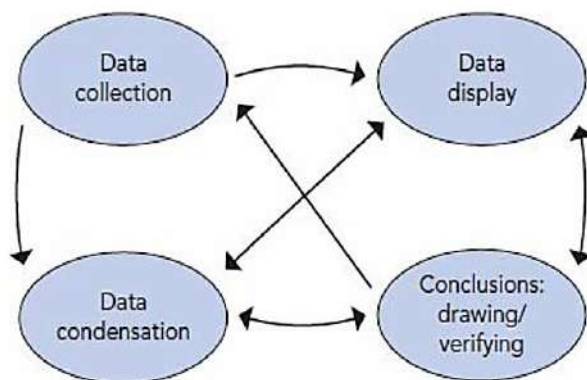
Figure 2. Qualitative data analysis
(Source: Miles et al., 2014)

In this study, the data condensation technique used is thematic analysis. Vaismoradi et al. (2013) stated that thematic analysis is most helpful in studying phenomena relating to user concerns or reasons for utilizing or not utilizing a specific procedure. Performed over textual data obtained from an interview or a set of interviews, thematic analysis may show commonalities in the transcripts.

Usually, themes defined in the analysis may be abstract. However, as long as said themes encapsulate a point of importance concerning the research question, then they can be considered significant findings of the research (Braun & Clarke, 2006; Ritchie & Lewis, 2003). Ultimately, thematic analysis must be done multiple times to review the data objectively and repetitively to truly see the relationship between the data and the research questions.

4. Results

The analysis resulted in 124 code nodes, 29 categories, and five themes, as described in Table 2. Each of the themes will be elaborated in their respective sub-sections.

4.1. Engage

This theme concerns how students decide on the initial direction of their project. This relates to what steps the students take to first understand the impetus of the project, choose from multiple ideas they come up with as possible directions, and to finally decide on an idea to carry as a driving challenge of the project. They also mention how they work together, develop ideas and plans, and solve problems. Informants declare that they find a way to connect and relate to the issue at hand during the Engage phase.

> *because in the Engage phase, we each had our thoughts. At first, we empathized with our problem, each trying to empathize. In the Engage phase, we were also helped by mentors together to align our minds. (5M, 1)*

It is also essential to ensure the team chooses ideas that fit them, time-wise and skill-wise. Once a team decides on an idea or ideas to work on, they need to familiarize themselves with the idea to explore further what the idea might hold for the project and filter out ideas based on feasibility.

> *So the team's ability, oh, it turns out this person still has no experience, oh, this is his experience, oh, this is his ability, and so on, his connection with other people is like this. So, identifying your team is also crucial because it determines how much we would want to iterate on the problem. (9M, 2)*

Table 2. Categories and themes

No	Category (n= 29)	Theme (n=5)
1	COLLABORATIVE CULTURE *(The importance of working together, synchronizing team-members' goals and processes from the beginning)*	
2	ENGAGE ON ISSUE *(Connecting and truly connecting with the issue at hand during the Engage phase, to be invested with the team)*	
3	IDEA SELECTION *(Agreement on an idea to be taken to further developmental phases)*	ENGAGE
4	INDIVIDUAL ENGAGEMENT *(Student's commitment and engagement on the project, team, and idea)*	
5	INITIAL RESEARCH *(Familiarization with selected ideas, exploring the potential, direction, and development of the idea,)*	
6	TEAM-FORMING *(Selecting team members based on abilities and compatibility)*	
7	ANALYTICAL SKILLS *(Skills to assess the relevance and impact of the idea or project)*	
8	CONFIRMATORY RESEARCH *(Reviewing progress to ensure adherence to initial intention or direction)*	
9	MARKET RESEARCH *(gauging the market, confirming relevance, and assessing the continuity of the project)*	
10	NEW INFORMATION *(adoption and absorption of new findings or ideas to enrich the project)*	INVESTIGATE
11	SOLUTION INVESTIGATION *(Viability research of proposed solutions in relevance to initial idea)*	
12	SOLUTION RESEARCH *(Designing selected solutions according to the resources at hand)*	
13	USER INVESTIGATION *(Confirming the solution fit to the issue at hand, through the perspective of users)*	
14	SOLUTION CREATION *(Setting up a creation phase that is realistic and timely)*	
15	SOLUTION DESIGN *(Selecting solutions based on market competition and idea at hand)*	ACT
16	SOLUTION REVIEW *(Processing feedback and refining existing solution)*	
17	SOLUTION VALIDATION *(Project sustainability and relevance constant monitoring)*	
18	COLLABORATION *(The ability and tendency to work as a team to achieve a common target)*	
19	JOB EFFICACY *(Professional working experience using Challenge-Based Learning, implementable in real-life jobs)*	GROWTH MINDSET (PROFESSIONAL GROWTH)
20	JOB ENRICHING SKILLS *(Experience to prepare students for the professional work: impactful, empathetic, and understanding)*	
21	LIFE IMPACT *(Life shifts due to student's experience at the Academy and in experiencing CBL)*	
22	PROJECT MANAGEMENT *(Managing projects, as well as keeping track of tas responsibility and accountability)*	
23	ACCEPTING FEEDBACKS *(The ability to accept feedbacks and learn from them)*	
24	CAREER OPPORTUNITY *(Nurturing curiosity, flexibility, and adaptability to develop career adaptability and knowledge absorption)*	
25	CBL IMPLEMENTATION *(Habit-forming of thinking through the Engage- Investigate-Act framework)*	GROWTH MINDSET (PERSONAL GROWTH)
26	LEARNING FROM MISTAKES *(The ability to embrace and learn from past mistakes)*	
27	LEARNING OPPORTUNITY *(Making the most of the exposure to resources and individuals that is otherwise inaccessible)*	
28	LIFE SKILLS *(Interpersonal interactions, self-accountability, and organizational awareness)*	
29	SELF-DIRECTED LEARNING MINDSET *(The drive to constantly learn and grow, in relevance to responsibility held)*	

4.2. Investigate

The main process in this phase is to understand the strengths and weaknesses of the selected idea compared to others and how it can be manifested as an app used to address the challenge at hand. In this phase, the students analyze their challenge from various points of view to honestly assess the relevance and impact of their solution and be certain of the choices and direction made in relevance to the challenge and its respective solution.

strengthen the background of its goals and benefits. Why do we need to bring up this topic? It is more well-thought-of what we brought with us. Because, right, based on, what, based on the research too, right? (6F, 5)

Since the investigation phase is deeply rooted in research activities, naturally, students will obtain new information from various sources. Students must be aware of the world outside the Academy and their projects.

So, from the ideas that have been generated together, even though the Project Manager heads it, I do some research on it: If it were to be implemented, would it be supported by existing technology such as a library or a module, and with our capabilities... is this possible? (2F, 2)

Lastly, students must also conduct user interviews. The goal of these interviews is often of a confirmatory nature, which is to compare the results of literature research with what real users face in real life.

Sometimes, it turns out that what is written on the internet and what the user feels is different. So, because we cannot compare from just one side, we need to look for more users, other users, for validation. It turns out that if the users are dominantly like this, the internet is the opposite, like that. (8F, 5)

4.3. Act

Upon reaching a degree of confirmation regarding their solution concept, students then focus on a specific approach to their challenge, named the challenge statement. Students flesh out their solution concepts in this Act phase into a working application. Their minimum viable product will then be demonstrated

to potential users to receive feedback and be revised if needed.

Designing such a solution concept is done by consulting experts and seniors and observing existing solution options in the market. The idea, of course, is to maximize impact on the user and ensure that the app works in their favor.

So we look for solutions that do not exist yet and that help our targets. (8F, 6)

It is also very important for the students to make sure the production step is realistic, both in technicalities and regarding the timeframe. However, the team might realize upon completion of the app that their app has deviated from the intended challenge statement. This is why validation becomes crucial to confirm that the resulting app is still useful and impactful to its users.

Which one is realistic for coding? That is my opinion. (2F, 6)

Testing, to… to… those who have problems. Iterated to see if it was correct. It should be validated whether, eh, it is true, yes, that he needs that. (4M, 7)

From the ideas that you want to answer from the previous application and the previous features, what do you think has not been answered yet? If you could dream of any feature that you can have? (11F, 7)

4.4. Growth Mindset – Professional Growth

A growth Mindset is one's ability to see the potential of learning and growth in the various events and occurrences in life, both good and bad, and to grow oneself from what is learned in that experience. The professional aspect discussed here shows how students learn to be professionals and how to be a contributing part of the workforce. This includes the various skills they may have picked up over their experience at the Academy implementing Challenge-Based Learning or something they experienced and learned from over their time in the Academy program.

Students are always encouraged to work together as a team in every project, including how they can synchronize and support each other with the purpose of better execution and completion of the project.

In terms of progress, usually in our group at the Academy, there is a daily setup every morning, so it is like asking one by one, yesterday, what were the results like? For the tech one, what about the design? What are the results? Usually, the PM is the one leading, so I will see, oh, the tech has finished so the only one who moved it in Kanban was our PM. The tech or design people do not move it in Kanban, so the person in charge of project management could control it more easily (5M, 7).

The students experienced four cycles of Challenge-Based Learning at the Academy and are becoming more adept in utilizing the framework towards the end of the Academy program. The idea behind this is to build professional working experience and how they can provide outcomes that come from their experience in the academy and be aware of what skills are needed to help their careers in the future.

So I feel more empathetic. Then he, more…, I think…, I think more critically (4M, 9).

However, if you enter the corporate world, there are already separate sections. Nevertheless, we still need to investigate, engage, and act (2F, 16).

4.5. Growth Mindset – Personal Growth

The personal aspect of the Growth Mindset discussed here shows how students learn to grow as individuals in the various facets of life and how to grow in the future continuously. This includes the various skills they may have picked up over their experience at the Academy implementing Challenge-Based Learning or something they experienced and learned from over their time in the Academy program.

In the Academy, students are encouraged to try developing their hidden potential, to follow their curiosity, and always to be willing to change for the better. Naturally, this builds flexibility and adaptability in the students, which then translates into their ability to work in various career fields and to absorb new knowledge quickly.

So, maybe after leaving here, eh…, look for other opportunities, to learn too, and implement what I have got. (6F, 13)

After ten months, students are accustomed to using the Engage-Investigate-Act phases in their projects and careers to be confident and certain of their actions to finish the project well. On the other hand, the students make various mistakes regularly, both from old habits or from a lack of knowledge. Therefore, what sets Academy students apart is their ability to own their mistakes and learn not only not to repeat the same mistakes but to become better individuals.

Nevertheless, it turns out we do research over and over, and I feel like in the middle of our research, this is not something we can help with because actually some…., what I mean is some things are too personal, in my opinion. For example, it is personal in a way that we can't possibly change people's hearts through digital means (11F, 19).

At that time, because we were already in the middle of development, we realized we were too in love with the concept, and it wasn't valid. Like it or not, we end up pivoting, even though the time is tight; we realize that it's useless if we continue, as it will not work, right? It is better to pivot; in the end, the pivot is better than our initial concept. (5M, 9).

Students are exposed to various guiding resources in the Academy, both domestic and international experts of various fields. Therefore, they are naturally exposed to learning opportunities not available to others outside of the Academy. They are also encouraged to interact meaningfully with their peers, and as such, they learn how to be more positively impactful in life. Finally, each Academy student is responsible for their activities, targets, and learning journey. The Academy encourages students to be independent in assessing their needs and in taking the necessary steps to improve themselves. This Self-Directed Learning mindset is one of the core beliefs of the Academy, where one must know what one must learn and do, to complete one's responsibilities.

If I am honest, I learned a lot and the initial expectation was to develop an app; no, I did not expect something like, uh, to have to jump in, like, in marketing and that too, what do you call it, <tongue clicking> uh, the final product, the final application, that has to be uploaded to the App Store. (6F, 2)

Erm, I think a system where we can sort of organize ourselves, manage our groups, by carrying out all the processes is like... eeeh,

giving us a sense of responsibility for what we do ourselves. (11F, 22)

5. Discussion

The prevailing opinion is that Challenge-Based Learning prepares the students of the Academy for the future in terms of personal growth. This aligns with Challenge-Based Learning (CBL), which encourages students to be engaged in their work, taking on relevant issues needing solving with a scientific approach at their own pace to build a solution to their own identified (and validated) problems. (Johnson et al., 2009)

The challenge is to confirm that the Academy's students are impacted by engaging, investigating, and acting, which are the main processes of the CBL framework (Apple Inc., 2010; Nichols et al., 2016). It is also interesting to see whether Reflect, Document, and Share, the supporting activities in CBL, impact the students significantly in the process. In the current setting, the learning journey consists of activities in which the students are directed to engage with the idea at hand, investigate relevant solution alternatives, and act upon a synthesized solution as their final product. Through the process, the students go through CBL activities that expose them to new mindsets and standards, ultimately resulting in new personal developments (Dweck, 2016).

The discussion of the findings of this study will continue in three parts. The first part will discuss the major findings from the interview and the following analytical process. The following part will discuss the emerging themes identified during the interview and analysis. The last part will address the limitations of this study and any feedback it can provide to improve future practices in the Academy.

5.1. Impact of Engage to Growth Mindset

Engage is one of the integral parts of the whole Academy experience, contributing to the growth and development of Academy participants (Nichols et al., 2016). Specifically, how can students start developing awareness of the issue at hand? Initially, students will be provided with a Big Idea that serves as a prompt for their thinking process, followed up by team dynamics as the students will have to be in a team before embarking on further development of the initial idea. Ultimately, the team will create a Challenge Statement, signifying what they will do as a team that will impact the users of their app.

In summary, the Engage phase contributed to the development of the Growth mindset through

the accountability of one's own ideas and actions, being a part of a team, and being accountable for the team's ideas and actions. The Engage phase also encouraged students to be creative and elaborate in their idea creation and development while being open to other possibilities and perspectives. The ability to have different views within a team to the point of differing opinions is commonplace in the Engage phase as well as in life, and consequently, finding a workable middle ground in terms of ideas becomes very crucial in ensuring the success of a project (Masten, 2001; Yeager & Dweck, 2012). Hence, this experience enhances the students' readiness to collaborate in the workplace after graduating from the Academy.

5.2. Impact of Investigate to Growth Mindset

Investigating is the phase following Engage in the CBL framework. The Investigate phase allows the students to refine their challenge, validate their proposed solution, and synthesize a solution to be acted on (Nichols et al., 2016). This is a research-intensive phase in which each student may propose a different approach to solve their Challenge Statement.

In summary, the entire Investigate phase contributed to developing a growth mindset through the habitualization of investigating the validity and accuracy of ideas or concepts, receiving feedback, and acting upon them. The main premise of the investigation is to keep an open mind to possibilities, especially those outside of the students' typical range of knowledge (Dennis, 2016). Therefore, it is crucial for the students to research various sources constantly to discover different perspectives on the matter at hand. This is usually applied to the challenge statement and solution concept. However, the analytical and investigative skills involved are usable in other situations, such as the workplace and life in general.

5.3. Impact of Act to Growth Mindset

Students act on their synthesized solution in the Act phase based on their challenge statement (Apple Inc., 2010; Nichols et al., 2016). Regarding the Academy, this phase is where all the coding and testing takes place, and how users will finally be able to test the solution first-hand. The main activities in this phase are the actual production process and refining of the end product as the production goes on.

In summary, the entire Act phase contributed to developing a growth mindset through open-mindedness and the ability to constantly review and question progress to adapt better and correct issues in time.

For individual students, the Act phase is a good exercise to receive feedback for individual and team efforts, as well as from fellow team members or external potential users (Dennis, 2016). However, the most significant benefit for the students is how they can be very critical of their process and results, thus making decisions and taking actions to rectify said deviations and stay true to the project's initial purpose.

5.4. Growth Mindset of Academy Students

Dweck (2016) stated that a Growth Mindset is how an individual receives feedback and mistakes to adjust to challenges while learning enjoyably and ultimately becoming more productive. Students can always learn from the challenges they face, be it positive or negative (Yang et al., 2018). Therefore, Academy students always find a way to improve themselves throughout the learning journey and, as such, exhibit a growth mindset during their time at the Academy and bring it into their lives and careers. This study aims to recognize the impact of the CBL framework implementation on the students' adoption or development of the growth mindset. However, from analyzing the interview transcripts, the researcher has found how the growth mindset manifests in two major ways in the Academy students, professionally and personally.

Concerning the Growth Mindset, the interviews show how students, consciously or otherwise, develop a growth mindset in response to the CBL implementation in the Academy. The Engage phase drives them to interact with other students, to explore and elaborate ideas, and to empathize with others. The Investigate phase teaches them to be critical, inquisitive, and never take anything at face value. The Act phase demonstrates how no action is over when it is done, as everything can and must be reviewed, refined, and, perhaps, remade to remain relevant and impactful (Nichols, n.d.). Ultimately, the researcher believes that the 10-month program at the Academy prepares the students with the necessary skills and experience for what lies ahead in life and in their careers.

5.5. Managerial Implications

Firstly, the Academy team must set a plan to create a different educational environment compared to traditional educational institutions, which requires a different, albeit similar, learning process. Suppose the students accept that the method of learning in the Academy is inherently different from the learning they have had so far. In that case, they may be more open-minded to different activities, lessons, and methods applicable in the Academy currently and in the workplace of the future.

Secondly, the Academy team must implement methods of observing, collecting, and analyzing students' feedback regarding Academy activities, both shared willingly with the Academy team or shown visibly in their behavior. This pre-emptive action can be quickly translated into an activity adaptation in the next Academy phase, learning from the students' responses in past activities.

Thirdly, this process must be implemented regularly and reviewed with the cohort's dynamics in mind. Although these suggestions are made with the results of this study in mind, they must still be taken with a grain of salt since future cohorts may differ from the 2022 Cohort this study is based on.

In summary, to have a clear line of sight of the actual issue at hand, it is imperative to start having interview sessions, ideally, or a Focus Group Discussion among the Academy students at both the beginning and the end of the Academy program. The intention is to gauge the expectations and perspectives of the students regarding the Academy's image compared to other, more traditional, educational institutions. This will be invaluable in measuring the gap between students' expectations and the existing reality, including determining what can be done to collect students' feedback on their Academy experience periodically.

Surveys should be the main avenue of data collection, accompanied by random interviews to gauge the validity of survey outcomes. Ideally, this process is done between projects or every three months. Lastly, reviews should be done at a higher management level, among managers and directors, to determine the current impact of CBL on the students and to measure the efficacy of current learning practices. Similarly, the review should be done after each survey is concluded, and one major review must be held at the end of the program in preparation for the coming cohort.

5.6. Limitations

The limitations recognized in this study are the limited pool of subjects, the nature of the study and its timeframe, and the feasibility of impacting future Academy activities. However, the main limitation of the study is regarding the time frame. Future studies should consider this to have more impact on the Academy and to have a smoother process of interviews and analysis of the results.

6. Conclusions

This study was designed to understand the impact of Challenge-Based Learning on Academy students in Surabaya. Generally, based on experience and discussions with past employers of Academy

graduates, Growth Mindset is the primary outcome from the academy that impacts the students the most, especially in their success in the workforce. Initially, the researcher begins by describing the basic model of the learning journey in the Academy. It consists of the three CBL phases: Engage, Investigate, and Act, each contributing to different manifestations of Growth Mindset. Therefore, this study confirms how Challenge-Based Learning in its phases equally drives the development of the Growth Mindset of Academy Students. This study also shows that the Growth Mindset developed from the Academy learning journey and the exposure to Challenge-Based Learning processes can be grouped into Growth Mindset in terms of Professional capacity and Personal Development. Thus, Academy students should be able to engage better in Academy activities and grow better into productive members of the working society, especially within the digital ecosystem of app developers.

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