

**Exploring Teachers' Utilization of Adaptive Learning
Platform Features to Foster Students' Self-Regulated
Learning: A Focus on ALEKS Platform**

استكشاف كيفية استخدام المعلمين لميزات منصات التعلم المتكيف لتعزيز
تطوير مهارات تنظيم التعلم الذاتي لدى الطلاب، مع التركيز على منصة أليكس

by

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Abstract

Adaptive Learning (AL) is a revolutionary promising technology that employs artificial intelligence to optimize students' performance and attainment by providing customized learning frameworks that cater to each learner's unique needs. However, the isolated nature of this learning environment has not only necessitated ensuring that students are equipped with the essential skills to thrive within this landscape but also underscored the importance of aligning teachers' practices to meet this demand. Cultivating students' Self-regulated learning (SRL) is a critical practice that is needed in this academic setting. A scarcity of studies that explore teachers' utilization of Adaptive Learning Platforms (ALP) to foster students' academic competencies, including SRL, was noticeable. Focusing on ALEKS, this study investigates teachers' perceptions of the effectiveness of ALEKS's features in promoting students' SRL skills. Additionally, the study seeks to assess teachers' employment of ALEKS's tools to enhance students' SRL. Thirdly, this study explores how ALEKS's features could enhance students' SRL. A parallel mixed-method approach was adopted to address the research questions: an online questionnaire and semi-structured interviews. The findings revealed a general affirmation among teachers of ALEKS's capacity to promote students' SRL. Moreover, the findings showcased the presence of teachers' employment of strategies that are believed to foster students' SRL skills within ALEKS context and underlined the need for more consistent engagement. Furthermore, the findings, combined with the theoretical framework, demonstrated ALEKS's SRL promotion potential. The results additionally highlight obstacles to using ALEKS or other ALPs, and shed light on valuable implications for educators, policymakers, and instructional designers.

Keywords: Adaptive learning systems, Self-regulated learning, ALEKS, Teachers' utilization, SRL promotion

خلاصة

التعلم التكيفي هو تقنية ثورية واعدة تستخدم الذكاء الاصطناعي لتحسين أداء الطلاب وتحصيلهم من خلال توفير أطر تعليمية مخصصة تلبي الاحتياجات الفريدة لكل متعلم. ومع ذلك، فإن الطبيعة المعزولة لبيئة التعلم هذه استلزمت ضمان تمتع الطلاب بالمهارات الأساسية للنجاح ضمن هذا السياق، وأكدت أيضًا على أهمية مواصلة ممارسات المعلمين لتلبية هذه الاحتياجات. تعد تنمية التعلم المنظم ذاتيًا للطلاب مهارة بالغة الأهمية مطلوبة في هذا الإطار الأكاديمي. هناك ندرة ملحوظة في الدراسات التي تهدف إلى استكشاف مدى استخدام المعلمين لمنصات التعلم التكيفية لتعزيز المهارات التعليمية لدى الطلاب، بما في ذلك مهارة التعلم المنظم ذاتيًا. تتطرق هذه الدراسة لاستكشاف آراء المعلمين حول فعالية ميزات هذه المنصات التعليمية في تعزيز مهارات التعلم المنظم ذاتيًا لدى الطلاب وبالتحديد منصة ALEKS. بالإضافة إلى ذلك، تسعى هذه الدراسة إلى معرفة مدى توظيف المعلمين لأدوات ALEKS لتعزيز التعلم المنظم ذاتيًا لدى الطلاب. ثالثًا، تستكشف هذه الدراسة كيف يمكن لميزات ALEKS أن تعزز تنمية التعلم المنظم ذاتيًا للطلاب. تم اعتماد منهجية مختلطة موازية لتقديم الإجابة عن الأسئلة التي يطرحها البحث: استبيان عبر الإنترنت وإجراء مقابلات مع المعلمين. كشفت النتائج عن اتفاق عام بين المعلمين على قدرة ALEKS على تنمية التعلم المنظم ذاتيًا لدى الطلاب. علاوة على ذلك، أظهرت النتائج استخدام المعلمين لاستراتيجيات فعالة تعزز مهارات التعلم لدى الطلاب في سياق استخدامهم لمنصة ALEKS إلا أنهم بحاجة لزيادة معدل تطبيقهم لهذه الاستراتيجيات. كذلك أظهرت النتائج، جنبًا إلى جنب مع الإطار النظري، إمكانات ALEKS في تنمية التعلم المنظم ذاتيًا للطلاب. تسلط النتائج الضوء أيضًا على العوائق التي تحول دون الاستخدام الفعال لمنصة ALEKS أو منصات التعلم التكيفي الأخرى، كما تقدم الدراسة اقتراحات تطويرية قيمة للمعلمين وصناع القرار ومطوري المنصات التعليمية.

الكلمات المفتاحية: التعلم التكيفي، التعلم ذاتي التنظيم، ALEKS

Dedication

In honor of my late father, I present this work to you.

My mum, the guiding light of my journey

My wonderful siblings, whose support and love have been my strength.

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I would like to express my deepest gratitude to my supervisor, Prof. Christopher Hill, this endeavour would not have been possible without his expertise and guidance, which have been instrumental throughout my study.

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List of Abbreviations

AI - Artificial Intelligence

AL - Adaptive Learning

ALP - Adaptive Learning Platforms

ALS - Adaptive Learning Systems

ALEKS - Assessment and LEarning in Knowledge Spaces

BLT - Behaviorism Learning Theory

BUID - British University in Dubai

CIP - Cognitive Information Processing

ESE - Emirates School Establishment

ICT - Information and Communication Technology

KST - Knowledge Space Theory

LA - Learning Analytics

LMS - Learning Management System

MCQs - Multiple Choice Questions

ML - Machine Learning

SLT - Social Learning Theory

SCLT - Social Cognitive Learning Theory

Chapter 1: Introduction

1.1 Study Background

In recent years, technology has become undeniably ubiquitous, permeating every aspect of our lives, and education is no exception. The integration of technology in education has been rapidly evolving, offering multiple tools and resources that have been used to engage learners, enrich traditional pedagogical approaches, and enhance the overall educational paradigm. Despite these advancements, teaching and learning strategies have consistently failed to account for students' diverse needs and learning gaps, leaving a cohort of disadvantaged students falling behind. Tailoring instruction to meet each individual student's needs has always been a challenge. As technology continues to mature, it overcomes the constraints of traditional learning methods and enhances educational methods. The emergence of Artificial Intelligence (AI) came as a game changer in the realm of education. AI-powered technologies offer great potential to improve education, eliminating the ultimate limitation of traditional learning: the one-size-fits-all approach. One of the most impactful innovations of AI in education is the development of Adaptive Learning Systems (ALS). Adaptive Learning (AL) is an educational technology that customizes a unique learning path for each student. With the aid of Learning Analytics (LA), the ALS assesses students' performance and progress and adjusts students' learning paths accordingly (Ahmad & Rafhi, 2020). These technologies are used to collect and analyze student's data on an individual basis and decide the best course of action that would suit that particular student's needs, outline each student's learning content and characteristics, determine the appropriate tools and time that would best fit student's needs to master a pre-set learning objectives (Gebhardt, 2018). ALEKS, short for

Assessment and Learning in Knowledge Spaces, is an AI-powered platform that is designed to spot students' learning gaps, customize their learning path accordingly, and monitor students' learning and mastery development is one example of the prominent ALP (Mc Graw Hill, 2024).

While some teachers perceived the integration of ALS as a threat that could jeopardize their careers, others seized the chances it brings to improve their academic standing and enhance their teaching potential (Soler Costa et al., 2021). Through strategic utilization of ALS features and tools teachers not only might promote students' outcomes and reshape the class delivery, but also nurture students' academic skills and competencies. One important skill that teachers should promote in their students is Self-Regulated Learning (SRL). SRL refers to the ability of learners to have control over their learning process by setting realistic goals, monitoring their progress towards those goals, employing and adjusting strategies to optimize their results, and allocating the required time to achieve these goals efficiently (Anastasia Kitsantas, Nada Dabbagh, 2010). Besides being essential skill for learners' success, SRL is extremely needed in AL setting (Leung et al., 2022a; Park et al., 2022). Usually students engage with Adaptive Learning Platforms (ALP) independently with absence of the instructor's direct supervision (Sabourin et al., 2012). This fact emphasized the need to ensure that students possess the necessary skills to navigate and benefit from their interactions with these platforms. The success of ALP implementation heavily relies on the role of teachers. Teachers' astute employment of ALP tools can cultivate students' academic skills and competencies including SRL skills.

1.2 Problem Statement.

The emergence of AL is reshaping the educational technology landscape, promising to revolutionise conventional teaching and learning methods. This innovative technology customizes a unique learning path for each student based on the student's profile, current knowledge, skills, performance, and real-time interaction with the ALS, making learning more effective and engaging. Nevertheless, this technology presents its share of challenges. Student-teacher interaction, class discussions, as well as classroom ethos are argued to be cardinal contributors to students' learning (Pino-Pasternak et al., 2014). As the level of interaction and the intensity of students' engagement can differ significantly depending on the type of learning environment, the isolated environment of ALP could potentially impact students' ability to initiate their learning and maintain control of their academic pursuits (Soler Costa et al., 2021). The inherent solitude of this learning milieu, coupled with the lack of direct student-teacher interaction, necessitates ensuring that students acquire the essential skills to benefit and prosper within this landscape and emphasizes the significance of teachers adapting their methods to meet this demand. SRL is a critical skill that is highly needed in this academic setting (Leung et al., 2022b; Park et al., 2022). When optimized by design and effectively harnessed, digital learning platforms as metacognitive tools can play a pivotal role in developing students' study competencies and SRL processes such as goal setting, self-evaluation, and time management (Anastasia Kitsantas, Nada Dabbagh, 2010). Students' learning is enhanced when students are encouraged to evaluate their learning, ALPs employ tools that allow students to monitor their progress (Soler Costa et al., 2021). Anastasia Kitsantas and Nada Dabbagh (2010) cited Chang's (2007) argument that designing and

developing online learning platforms should prioritize facilitating students' SRL processes. ALP offers students a range of features and tools to help them organize, sequence, and get assistance when needed (Soler Costa et al., 2021). Furthermore, ALSs are designed with metacognitive strategies, including self-monitoring, self-assessment, and reflection, which allow students to gain a deeper understanding of their learning process (Hashim et al., 2022). Students can set goals, track progress, and evaluate outcomes to achieve success in their online studies. The feedback provided by the adaptive system helps students enhance their metacognitive skills and reach their full potential (Hashim et al., 2022). Not all students are ready to take control of their own learning, as they lack self-efficacy and self-confidence, teachers' role is crucial in supporting learners to develop appropriate strategies that ensure their academic success. It is essential for educators to be able to recognize students with low self-regulation awareness and provide the appropriate support needed (Sabourin et al., 2012). Knowing which self-regulatory processes are supported within a digital framework can assist instructors in providing the scaffolding needed to promote students' SRL as well as target and improve specific SRL skills (Devolder et al., 2012).

The emergence of ALS has presented a fertile ground for investigation. The vast of conducted studies concerning the integration of ALS defaulted to scrutinizing ALS's impact on students' performance, learning outcomes, comparing ALS with conventional education, examining students' results on standardized exams both before and after using AL technology, surveying instructors and students' perspectives, and outlining the benefits and drawbacks of the ALS. However, there is a scarcity in investigating ALS impact on students' critical academic skills such as SRL (Harati, Sujo-Montes, Tu, Armfield, Yen, et al., 2021).

Moreover, there remains a dearth on investigating teachers' evolving role within ALS setting (Ahmad & Rafhi, 2020). Furthermore, investigating teachers' perspectives pertaining ALS' features potential of fostering students' SRL and autonomy, as well as teachers' utilization of ALS tools to cultivate students' SRL and autonomy are underexplored as well.

This study would delve into ALP impact on students' SRL development from teachers' outlook. Additionally, the study will explore the extent to which instructors are employing ALP tools and features in a way that would foster students' SRL. Thirdly, this study would examine the extent to which the inherent characteristics of ALP would foster students' SRL and autonomy. Focusing specifically on ALEKS, this study aims to address the gap in current research as it shed the light on the intersection of ALP attributes, teachers' integration and employment of ALP, and students' SRL growth. The insights obtained from the findings of this paper would benefit educators who are seeking to enhance their teaching methods and empower their students' autonomy. The findings can assist policymakers in making informed decisions regarding the implementation of professional development programs that aim to equip teachers with the necessary practices to leverage ALP effectively. Additionally, instructional designers and developers can benefit from the study findings by considering sorting out any limitation that the findings might have addressed.

1.3 Research Purpose and Research Questions

This study investigates teachers' substantial role in fostering students' SRL skills, particularly when using the ALP ALEKS. To fulfil the objectives of the study, the three research questions below will be addressed:

RQ1-How do teachers perceive the effectiveness of ALEKS features in fostering students' self-regulated learning?

RQ2-To what extent are teachers utilizing the features of ALP, ALEKS, to foster students' self-regulated learning?

RQ3-To what extent do the features of ALP, specifically ALEKS, support and enhance students' self-regulated learning?

It is crucial to point out that there is a shortage of literature that examines the roles and practices of teachers, which would enrich the AL experience and prepare well-equipped students.

1.4 Study Organization

This study consists of 6 chapters:

Chapter 1: Introduction that presents the study background, the statement of the problem, as well as the study objective and the research questions.

Chapter 2: A literature review section that includes a conceptual framework introduces the key concepts and terminologies used in the study, as well as provides relevant background information on ALEKS. Additionally, a theoretical framework that outlines the theoretical foundations of the research. This section will also include relevant works that informed the study.

Chapter 3 presents the methodology adopted in this study, including the research design, participant selection, instrument construction and validation, data analysis approach, and ethical considerations.

Chapter 4: This section presents the data collected using the questionnaire and the insights obtained through the semi-structured interviews.

Chapter 5: This chapter discusses the findings of the research, interprets the results, and answers the three research questions.

Chapter 6: The conclusion chapter highlights the main findings of the study, presents the researcher's recommendations, limitations of the study, and suggestions for future research.

Chapter 2: Literature Review

The aim of this research is to explore teachers' perspectives on how ALEKS platform can enhance students' SRL skills. In addition, it investigates how teachers utilize the various features of the platform to promote students' autonomy and SRL. The study aims as well to examine ALEKS's impact on students' SRL outcomes. This section provides a conceptual framework that introduces the key concepts and terminologies used in the study as well as relevant ALEKS background, a theoretical framework that outlines the theoretical foundations of the research. Additionally, this section presents relevant scholarly literature that informs the study.

2.1 Conceptual Framework

2.1.1 *Adaptive Learning Systems (ALS)*

The rapid growth of ALS and its widespread use in educational settings, combined with the various dynamic factors dictated by the educational context and needs, have led to a lack of consensus on the exact definition of ALS (Cavanagh et al., 2020; Shemshack & Spector, 2020). Adaptive Learning (AL) is an educational technology that creates a customized learning path for every student, considering their individual profile, existing knowledge, skills, performance, and real-time engagement with the ALS. ALS enables a personalized educational experience that caters to the unique needs of each student, thereby maximizing their learning potential and fostering their academic growth (Fuad et al., 2018; Shemshack & Spector, 2020). Using Learning Analytics (LA), Machine Learning (ML) algorithms, and Artificial Intelligence (AI), ALSs continuously examine student interactions, performance data, and feedback, this data-driven strategy enables the system to personalize

recommendations and make real-time adjustments for each learner, tailoring the educational process to meet their unique needs, capabilities, and limitations (Ahmad & Rafhi, 2020; Soler Costa et al., 2021). The employed LA assists the ALP in identifying the strengths and weaknesses of each individual student. Based on this data, a customized intervention is generated that caters to the specific needs of each student. The ALP facilitates a fully personalized education that takes into account the learning needs of each student. This approach ensures that students receive the right intervention to help them achieve their academic goals (Gebhardt, 2018) .

The Cognitive Information Processing (CIP) and the retrieval of learning method, or as called “Testing to Learn”, are the primary pedagogical approaches ALS adopts (Soler Costa et al., 2021). ALS utilizes the concepts of chunking and CIP to enhance content delivery. The employed instructional method breaks down the educational content into discrete and cohesive units or chunks that are carefully matched to the student's cognitive capacities. This approach has been found to improve both comprehension and retention of information (Mayer, 2003). Moreover, ALS offers personalized support by providing additional resources, examples, or explanations based on each learner's performance and progress (Matayoshi et al., 2020; Soler Costa et al., 2021). By the incorporation of these strategies, the ALP provides learners with a more effective learning process (Kabudi et al., 2021). ALS employs the principles of retrieval learning and testing. The learning activities in these systems, which include frequent retrieval practice and assessment, are designed to get students to recall and apply previously acquired knowledge actively. The algorithms used by ALP modify the degree of difficulty and the order of questions in response to the replies and interactions of the students. By using this technique,

learning delivery adapts to the student's needs, which improves the educational process and promotes increased understanding and topic mastery (Soler Costa et al., 2021).

Despite the fact that AL became popular as an emerging educational technology in the last two decades, the phrase itself was first used and put into practice in the early 1950s of the preceding centuries where Crowder's system was introduced (Cumming 1998). A multiple-choice test designed by Norman Crowder was created to assess the knowledge of the United States Air Force engineers. Based on the chosen answer, the engineer would be promoted to the next stage of information, which would be followed by another set of multiple-choice questions designed to further refine and enhance the engineer's specific skill set (Cumming 1998).

According to Gebhardt (2018) and Sullivan et al. (2020), there are two main categories of ALS courseware: designed adaptive courseware and algorithmic adaptive courseware. In designed adaptive courseware, the course instructor has a say on the content and order of material delivery. The instructor has the authority to make decisions and create a working roadmap based on the LA and feedback provided by the ALS. Platforms such as SmartSparrow and LoudCloud are examples of instructor-authored platforms where the instructor has control over the design and customization of the courseware (Gebhardt, 2018; Soler Costa et al., 2021). Whereas content vendors provide algorithmic adaptive courseware, and its primary focus is on assessing the learner's current knowledge and determining the next steps in the learning process. These courseware platforms rely on algorithms and data-driven approaches to dynamically adapt each learner's learning experience. The content vendor takes responsibility for creating and refining the algorithms that drive the adaptivity of the

courseware. ALEKS and LearnSmart platforms are examples of algorithmic adaptive courseware platforms (Gebhardt, 2018; Soler Costa et al., 2021).

2.1.2 Knowledge Space Theory (KST)

Developed by Doignon in 1985, KST was introduced as a mathematical cognitive theory that aims to evaluate students' knowledge levels.(Doignon & Falmagne, 2016). KST essentially suggests that knowledge is made up of a set of items, with each item representing a narrow and focused piece of knowledge (Cosyn et al., 2021; Spoto et al., 2010). In AL, the accumulation of hundreds of items forms an academic course. KST is founded on four core terms; an item, a knowledge domain, a knowledge state, and knowledge structure (Doignon & Falmagne, 2016; Spoto et al., 2010).The knowledge domain represents the set of items that represent a specific topic within a certain subject; for example, in a mathematics course, the knowledge domain might include algebra, geometry, or calculus Falmagne. The knowledge state represents learner's current level of knowledge pertaining an item within a certain knowledge domain. The network of the interconnections of different knowledge states represents the knowledge structure, i.e., a student whose knowledge state belongs to a knowledge structure will successfully complete any task under this structure and would fail in those which do not belong (Spoto et al., 2010). By dividing knowledge into finite discrete items, categorizing these items into knowledge domains, and examining students' knowledge states, KST provides a thorough evaluation for student's knowledge and highlights student's areas of weakness, assisting the ALS to target these areas.

2.1.3 ALEKS Background

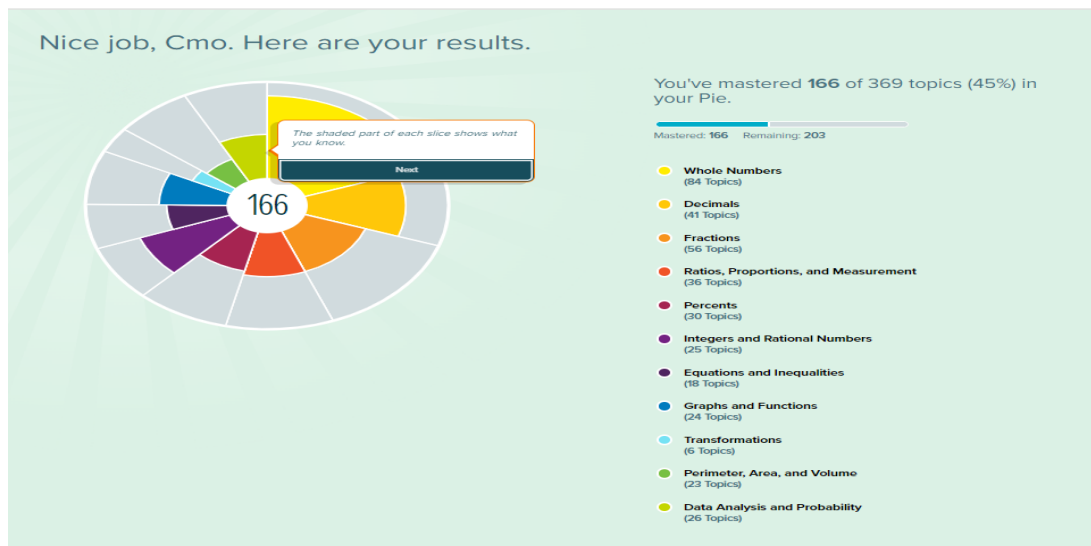
ALEKS platform, short for Assessment and LEarning in Knowledge Space, is an AI-powered ALP that employs KST to build study plans that are tailored to the unique needs of each individual learner (Harati, Sujo-Montes, Tu, Armfield, Yen, et al., 2021). ALEKS is an innovative educational platform that assesses students' knowledge, identifies their mastery areas, and provides customized learning materials to enhance their academic attainment (Matayoshi et al., 2022). ALEKS was developed at the University of California and is now owned by McGraw and Hill (Hill, 2023). While initially focused on math and chemistry, ALEKS has since expanded its offerings to include Statistics and Accounting (Matayoshi et al., 2022).

Student's first interaction with ALEKS starts by undertaking a knowledge check, with each student receiving a unique set of questions, this assessment comprises 25 to 30 questions based on the course materials and aims to examine student's current knowledge and highlight student's areas of weaknesses. ALEKS as an ALS adjusts to each student's performance. If a student provides a correct answer, the system increases the difficulty of the questions and presents more advanced concepts. On the other hand, if the student's answer is incorrect, ALEKS uses a targeted strategy to revisit the basic concepts and provide more fundamental questions (Ahmad & Rafhi, 2020). Based on KST, individualized assessments accurately determine students' knowledge state (Fang et al., 2019). This technique facilitates a customized learning path for each student that would guide the learner to achieve mastery of the course content.

Once the student completes the knowledge check, the student receives a coloured pie chart, the ALEKS Pie. This pie chart is divided into sections representing the various topics covered in the course. In ALEKS Pie, any coloured portion indicates that the student has already understood and mastered this part of the curriculum, while the grey areas represent what the student still has not fully grasped and needs to work on. By selecting any slice of the pie, students can see more information of their mastery of that specific topic. In addition, ALEKS offers the students a timeline that showcases the student's learning journey and week-by-week milestones, which allows the students to visualize their progress and keep them motivated (Hill, 2023).

Figure 1

ALEKS Pie, Student View



Based on the student's performance in the knowledge check, the student is then directed to the ALEKS learning environment or what is known as the “learning path”. A

unique learning plan that is tailored to meet the student's needs. In the learning path, the student is presented with the most ready-to-learn topics that are sorted in order of difficulty from easiest to hardest. Each topic page starts with a sample question, its explanation, and the final answer. The student can practice the topic by attempting consecutive exercises. By providing a streak of correct answers, the student has demonstrated mastery of the current topic and is ready to advance to the next topic in the learning journey (Hill, 2023). On a periodic basis, ALEKS revisits previously mastered topics to bolster students' attainment and comprehension (Hill, 2023).

Figure 2

ALEKS Learning Path

The screenshot displays the ALEKS Learning Path interface. At the top, a 'Ready to Learn' section shows three topic cards: 'Square root of a perfect square', 'Finding x- and y-intercepts given the graph of a line on a grid', and 'Table for a linear equation'. A callout box states: 'These cards list your easier Ready to Learn topics first. To select a topic, choose a card.' Below the cards, the 'Square root of a perfect square' topic is selected, showing a question: 'What is the value of $\sqrt{36}$?' and a detailed explanation. The explanation defines the square root, shows the calculation $6 \times 6 = 36$, and includes a grid diagram of a 6x6 square with area 36. The answer is 6.

Ready to Learn 30 Topics Filters

- Exponents, Polynomials, and Radicals
 - Square root of a perfect square
- Graphing, Functions, and Sequences
 - Finding x- and y-intercepts given the graph of a line on a grid
- Graphing, Functions, and Sequences
 - Table for a linear equation

These cards list your easier Ready to Learn topics first. To select a topic, choose a card.

QUESTION

What is the value of $\sqrt{36}$?

EXPLANATION

By definition, $\sqrt{36}$ is a positive number that, when multiplied by itself, equals 36.

Note the following:

$$6 \times 6 = 36$$

So this is what we get:

$$\sqrt{36} = 6$$

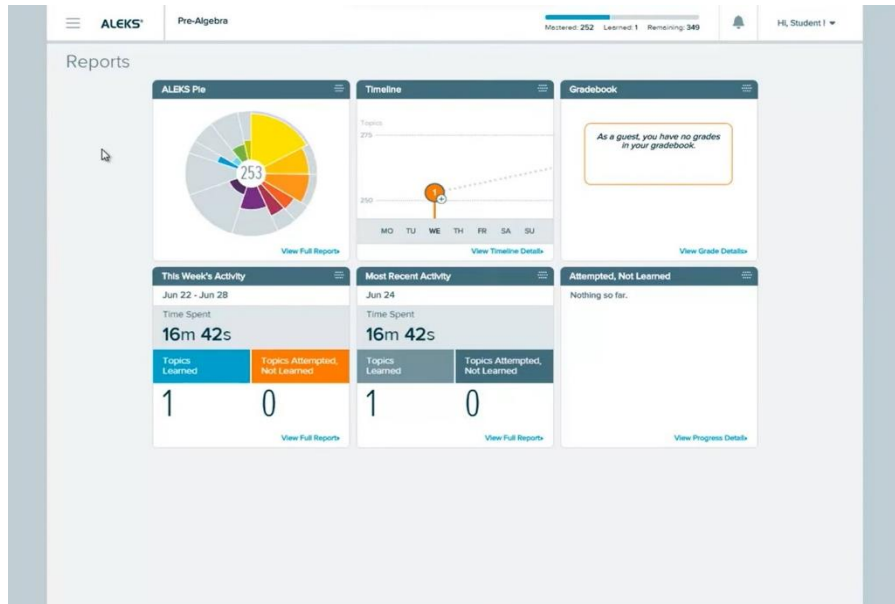
We can show $\sqrt{36}$ in a figure. It is the side length of a square whose area is 36.

As we can see, a square with area 36 has a side length of 6. So $\sqrt{36} = 6$ and we say that 6 is a square root of 36.

ANSWER

The answer is 6.

Start

Figure 3*Student's Reports Dashboard*

ALEKS teacher's module encompasses a set of features and tools that are instrumental for teachers to support and monitor students' learning progress. The key characteristics include class and student management features, reports and analytics, and other options that assist teachers in aligning ALEKS contents to meet their instructional goals. Within the instructor module, instructors are presented with a comprehensive roster that provides the teachers with essential students' information, such as students' login activities and mastery levels across different topics of the curriculum (Hill, 2023). Additionally, ALEKS instructor module provides real-time reporting that provides teachers with a thorough insight into students' performance and progress. Instructors can efficiently follow students both individually and collectively through ALEKS class progress reports, which outline students'

progress, topics learned, time spent and mastery percentage (Hill, 2023). ALEKS Pie report also provides teachers with a detailed breakdown of students' performance in each skill as well as students' readiness for new topics. By selecting a pie slice, instructors can access a complete list of topics within that skill and the percentage of students who have made progress in each topic. The report also highlights the percentage of students who are still falling behind in a particular topic and offers lists of students ready to learn specific topics (Hill, 2023). In addition to ALEKS class progress report and Pie report, ALEKS provides teachers with “time and topic” report, which offers teachers in-depth information on each student's activities, time spent and mastered topics. These features allow teachers to visualize students' understanding and mastery rates, identify areas for improvement, as well as group students according to their learning needs (Ahmad & Rafhi, 2020).

Figure 4

ALEKS Teacher's Dashboard

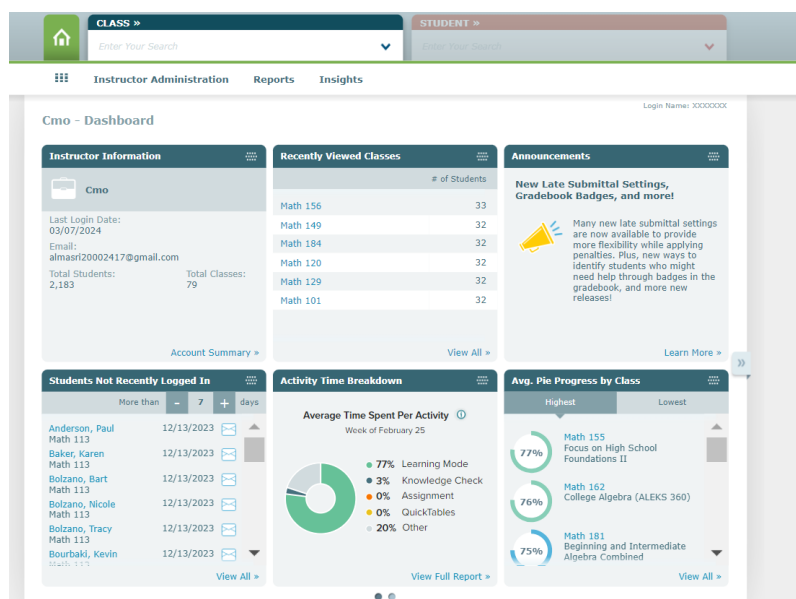


Figure 5

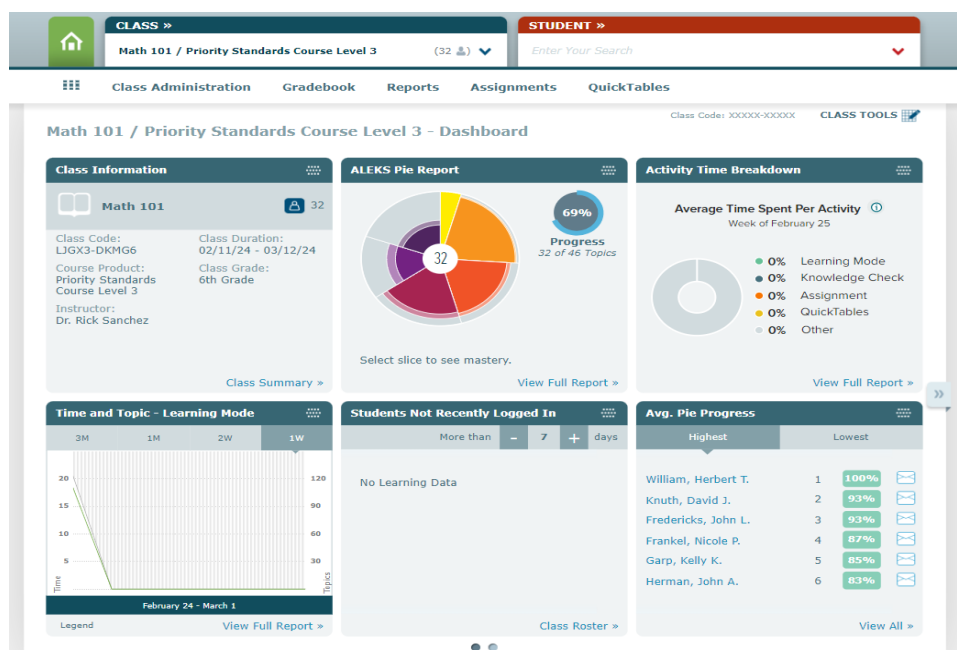
Teacher's Class Report Dashboard

Figure 6

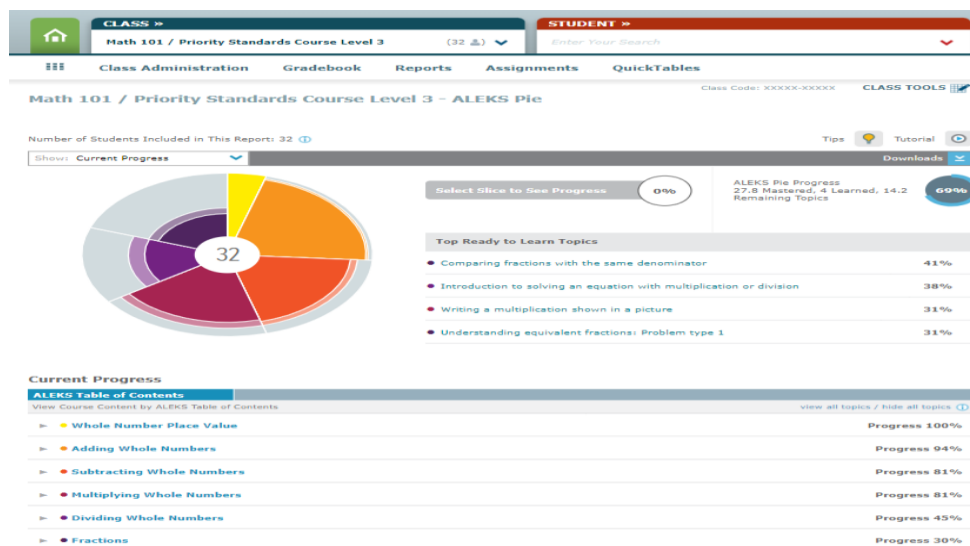
Teacher's Class Report Pie

Figure 7

Topic Class Progress Analytics

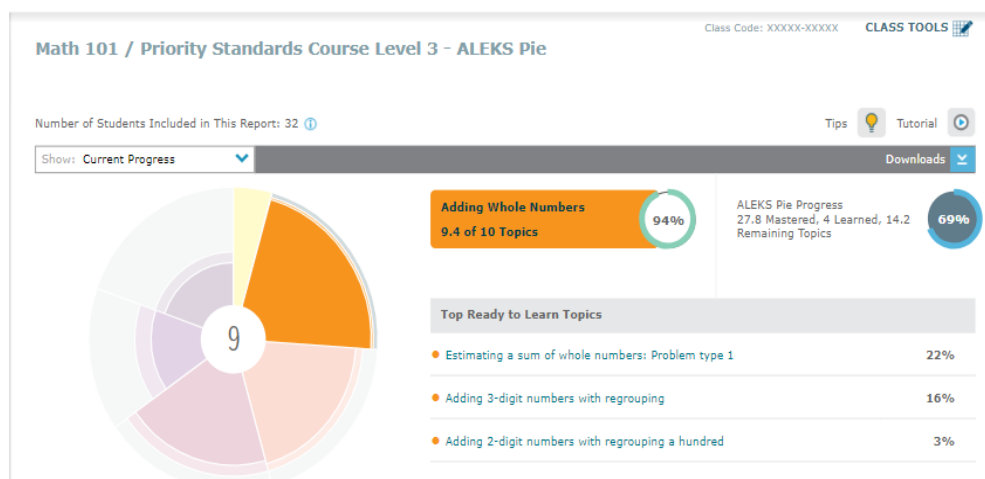


Figure 8

Teacher's View Class Roster

Math 101 / Priority Standards Course Level 3 - Progress Report

Class Code: XXXXX-XXXXX CLASS TOOLS

Number of Students Included in This Report: 32 Logged-in Students: 0

Shows: Learning Progress Since Latest Knowledge Check Downloads

Legend: ■ Content mastered based on the Knowledge Check ■ Progress made in Learning Mode ■ Content Remaining
● Knowledge Check in progress ● Student logged in

Student Information		Total Time	Last Login	Knowledge Check Start	Knowledge Check Finish	Performance	Since Last Knowledge Check	
☐ Student	Name ID Login					Class Progress Percent Topics	Topics Learned	Time in ALEKS Topics Learned Per Hour
☐	Alberti, Tracy L.	17h 42m	03/01/2024 6:00 AM	02/29/2024 40m 32s	02/29/2024 40m 32s	65 +5 %	2	3h 29m 0.6
☐	Anderson, Jill J.	16h 49m	03/01/2024 6:00 AM	02/28/2024 34m 53s	02/28/2024 34m 53s	50 +11 %	5	3h 31m 1.4
☐	Anderson, Karen P.	16h 39m	03/01/2024 6:00 AM	02/29/2024 43m 41s	02/29/2024 43m 41s	61 +6 %	3	3h 6m 1
☐	Bush, John J.	15h 25m	03/01/2024 6:00 AM	02/29/2024 35m 0s	02/29/2024 35m 0s	43 %	0	2h 59m 0
☐	Chang, Cindy R.	11h 26m	03/01/2024 6:00 AM	02/28/2024 43m 11s	02/28/2024 43m 11s	70 +10 %	5	3h 50m 1.3
☐	Davis, Bill B.	16h 3m	03/01/2024 6:00 AM	02/29/2024 31m 30s	02/29/2024 31m 30s	43 +5 %	2	3h 0m 0.7
☐	Davis, Daniel R.	17h 7m	03/01/2024 6:00 AM	02/28/2024 30m 20s	02/28/2024 30m 20s	50 +17 %	8	3h 37m 2.2
☐	Fisher, Karen R.	17h 35m	03/01/2024 6:00 AM	02/28/2024 38m 36s	02/28/2024 38m 36s	63 +11 %	5	3h 48m 1.3
☐	Frankel, Nicole P.	11h 26m	03/01/2024 6:00 AM	02/29/2024 37m 50s	02/29/2024 37m 50s	80 +9 %	4	3h 48m 1.1
☐	Fredericks, David A.	18h 39m	03/01/2024 6:00 AM	02/29/2024 39m 54s	02/29/2024 39m 54s	59 +8 %	4	4h 9m 1
☐	Fredericks, John L.	15h 10m	03/01/2024 6:00 AM	02/29/2024 41m 28s	02/29/2024 41m 28s	69 +4 %	2	3h 11m 0.6
☐	Garp, Kelly K.	17h 54m	03/01/2024 6:00 AM	02/28/2024 43m 1s	02/28/2024 43m 1s	65 +20 %	9	4h 17m 2.1
☐	Hard, Cindy P.	16h 49m	03/01/2024 6:00 AM	02/29/2024 33m 45s	02/29/2024 33m 45s	39 +4 %	2	2h 54m 0.7
☐	Herman, John A.	17h 14m	03/01/2024 6:00 AM	02/28/2024 33m 45s	02/28/2024 33m 45s	39 +4 %	2	2h 54m 0.7

2.2 Theoretical Framework

The main objective of this study is to investigate how ALS features and student-ALS interaction can foster students' self-regulatory and autonomy, as well as provide a deeper understanding of how instructors may enrich the efficiency of ALS in nurturing students' SRL skills. The study would draw upon two theories: Zimmerman's cyclical phases of SRL model and Bandura's Social Cognitive Learning Theory (SCLT). Both theories will assist in understanding the mechanism by which active monitoring, condensed practices and modelling, strategy refinement, self-reflection and positive reinforcement might direct individuals to regulate their learning.

2.2.1 *Zimmerman's SRL Models*

Self-regulated learning (SRL) can be described as an active and self-directed process motivated by learners' internal desire to achieve their learning objectives and enhance their satisfaction and motivation (Zimmerman, 1989, 2015; Zimmerman & Zimmerman, 2010). The process of SRL is a pragmatic approach that enables students to achieve their educational goals by combining their dedication, motivation, concentrated efforts, customized strategies, and genuine self-assessment. By implementing its pragmatic components, students can effectively attain their educational objectives (Barry J. Zimmerman, Dale H. Schun, 2001). SRL is a complex phenomenon in which an individual's cognition, motivation, beliefs, and social interactions synergistically contribute to attaining desired goals. The interaction of these factors affects the learner's ability to self-monitor, self-evaluate, and self-adjust their learning strategies to maximize their learning outcomes (Bandura, 1978). SRL comprises a conscious, goal-oriented cognitive pursuit undertaken by individuals intending to acquire knowledge

(Monique Boekaerts, 2005). SRL is learners' focused mental efforts to achieve their learning goals. It involves strategic planning, monitoring, and adjusting learning strategies to meet their academic objectives (Kitsantas & Dabbagh, 2010).

There has always been a keen interest in scrutinizing the factors that might assure SRL skills (Harati, Sujo-Montes, Tu, Armfield, & Yen, 2021; Hoda Harati et al., 2021). Perhaps the most prominent contributor in the SRL field is Barry Zimmerman (Panadero, 2017).

Zimmerman suggested that the learners have to undergo a set of self-regulatory processes to attain their learning goals; these processes are goal setting, task strategy, self-monitoring, self-evaluation, time management, and help-seeking (Badhe et al., 2021; Zimmerman, 2008).

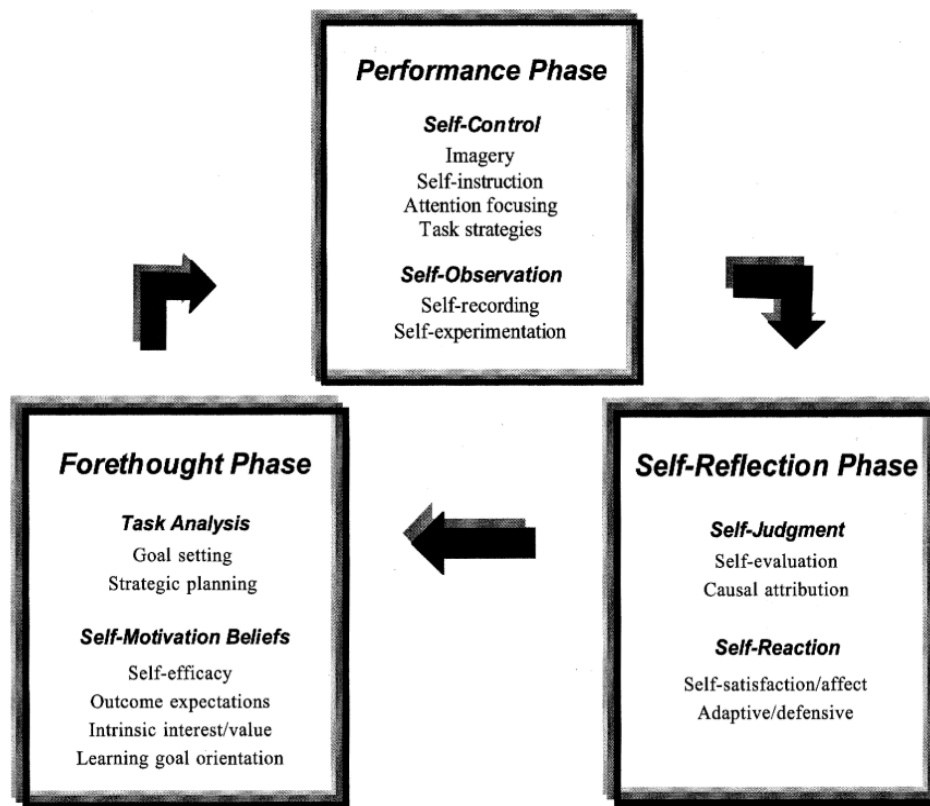
Zimmerman has developed three SRL models, each tailored to a certain learning theory (Panadero, 2017). Grounded in Bandura's triadic model of social cognition, Zimmerman has developed his first SRL model. The triadic analysis SRL model (1989), represents the reciprocal interaction among the three SRL aspects: the individual, the environment, and behavior (Anastasia Kitsantas, Nada Dabbagh, 2010).

Zimmerman then developed the cyclical phases of SRL, which is also known as Zimmerman's model; this model illustrates the interconnections among the cognitive process, actions, and self-reflection; it is also referred to as self-empowering cycles of learning (Anastasia Kitsantas, Nada Dabbagh, 2010). Zimmerman's model encompasses three phases, each of which consists of two subcategories. 1) The forethought phase, the cognitive phase, which includes task analysis and self-beliefs. 2) The performance phase, the metacognitive phase, which includes self-control and self-monitoring subcategories. 3) Self-reflection, which includes self-evaluation and self-reaction phase; During this evaluative phase, learners assess

their performance against their learning objectives; this evaluation serves as input for the forethought phase, and the cycle carries on, and the learner keeps adjusting (Anastasia Kitsantas, Nada Dabbagh, 2010), illustrated in Figure 9.

Figure 9

The Cyclical Phases of SRL



Note. Zimmerman & Zimmerman (2010)

The multi-level model, which has four phases—observation, emulation, self-control, and self-regulation—is the third model developed by Zimmerman (Panadero, 2017) .

According to Dabbagh's citation of Zimmerman B.J. (2000), learners may develop SRL

abilities via the sequential stages of the multi-level model (Anastasia Kitsantas, Nada Dabbagh, 2010). The model is illustrated in Table 1.

Table 1

Zimmerman Multi-level Model

Phase	Description
Observation	Learner observes a professional model.
Emulation	Emulation of the instructor with social assistance
Self-Control	The learner starts to master the steps without the use of models (main focus on process mastery)
Self-Regulation	Learner focus shifts to outcomes.

Despite the agreement that SRL is self-directed, researchers argue that SRL skills can be taught and developed in students (Anastasia Kitsantas, Nada Dabbagh, 2010). A closer examination of Zimmerman's three SRL models, models can be utilized to develop strategies that would direct learners, or in other words, train them to self-regulate their learning (Anastasia Kitsantas, Nada Dabbagh, 2010).

The main focus of this research is to investigate the crucial role that educators play in guiding students to acquire and effectively utilize SRL skills in the context of ALS. The study aims to accomplish this objective by utilizing Zimmerman's cyclical phases of SRL model, along with the recommended teaching practices suggested by Kitsantas & Dabbagh (2010) to promote and motivate students' SRL.

2.2.2 Social Cognitive Learning Theory (SCLT)

According to Albert Bandura, learning occurs through individuals' interactions with their environment and results in lasting changes in behaviour, knowledge, performance, and potential (Bnadura, 1978; Manik et al., 2022). Bandura started his research journey in the field of psychology at a time when the Behaviorism Learning Theory (BLT) dominated the field of learning theories (Krapp, 2015). BLT is predicated on the idea that behaviour is produced by reinforcement or reward (Monique Boekaerts, 2005). As a researcher, Bandura recognized the limitations in this theory, namely its lack of consideration for mental and cognitive processes in learning (Krapp, 2015). This realization led Bandura to develop his Social Learning Theory (SLT) which later evolved into Social Cognitive Learning Theory (SCLT) (Nabavi, 2012). SLT postulates that people acquire knowledge by observing the behaviors of others (Nabavi, 2012). Behaviour, cognition, and environment interact to shape learning in a social context, which is the main emphasis of SLT (Bandura, 1978). SCLT builds upon SLT by adding understanding and cognition to learning conditions and the mental processes involved in acquiring and imitating new behaviors, stating that learning occurs via observation, imitation, and modeling, as well as through cognitive and self-regulatory processes (Nabavi, 2012). The fundamental principle of SCLT is the belief that individuals can regulate their thoughts, emotions, motivations, and actions (Bandura, 1978).

Incorporating social and cognitive components has facilitated the comprehension of human interactions and cognition, hence elucidating human motivation and regulation. Adopting the multifaceted term Human Agency has resulted from this integration (Krapp, 2015). Human agency which Bandura introduced overarched four main concepts that

contribute to the understanding of human will-power: Intentionality-Agency; an individual's tendency to plan and execute intentional actions. Forethought; a cognitive process that suggests that individuals selectively perform their actions by favouring actions with positive outcomes and avoiding those with negative consequences. Furthermore, the notions of self-reactiveness and self-reflectiveness pertain to the motivational dimension of human behaviours, indicating that humans have the capacity to engage in introspection on their thoughts and actions, and exert control over them (Bandura, 1997).

2.2.3 Self-Efficacy

SCLT is closely linked to SRL as it considers self-efficacy under the umbrella of self-regulation (Barry J. Zimmerman, Dale H. Schun, 2001). Self-efficacy can be defined as individuals' beliefs about their capacity to exert a desired outcome through their actions or to succeed in task accomplishment based on their capabilities (Bandura, 1991; Irie, 2021; Manik et al., 2022; Mukhalalati et al., 2022). SCLT stated that self-efficacy is the keystone of human agency; The essential driving force behind self-regulation is an individual's confidence in their competence to achieve their goals and avoid negative consequences (Bandura, 1997). An individual's self-efficacy beliefs significantly impact fundamental psychological processes, including cognitive processes such as planning, goal setting, inhibition, and selection processes such as choosing a prospective career or specialization. The level of an individual's self-efficacy beliefs substantially impacts their ability to engage in effective self-regulatory behavior. Consequently, developing effective self-regulation requires the cultivation of robust self-efficacy beliefs (Krapp, 2015). Self-efficacy beliefs are acquired through a combination of personal experiences, vicarious experiences, social persuasion, and emotional regulation.

Self-efficacy beliefs are formed by reflecting on past successes and failures, observing others, receiving positive feedback from respected individuals, and developing emotional resilience (Krapp, 2015).

2.3 Related Works

2.3.1 *ALS Technology Impact and Efficacy*

The groundbreaking advancement in AL technology has attracted the attention of researchers, policymakers, and investors to investigate the impact of ALSs on teaching and learning and on students' achievements. The areas of investigation typically involved comparing the outcomes of conventional education with the one with ALS-supported education, analyzing students' performance before and after employing ALS technology, surveying teachers' and students' perspectives, as well as weighing the advantages and disadvantages of ALS integration. The efficacy of ALS has exhibited variability in research findings, with a considerable number of studies indicating the absence of a significant difference in students' performance, while other studies have asserted that individuals utilizing ALS technology demonstrated superior outcomes compared to their counterparts (Liu, 2022; Mathew, 2019). In a recent study, Liu (2022) used a mixed-method approach to assess the efficacy of the Taiwanese AL platform. While the quantitative analysis did not show any statistically significant enhancements in the academic performance of students who are utilizing the ALS platform, the qualitative component of the investigation highlighted the teachers' keen interest and emphasized the platform's value in identifying students' areas of weakness (Liu, 2022). Similarly, there was no discernible difference in students' performance when using the mastery-based ALS platform compared to the traditional model, according to

Mathew's (2019) study on the platform's efficacy. However, students did report that the platform helped them learn more effectively and retain information better. Gebhardt has also cited the assertions made by Griff & Matter (2013) and Murray & Perez (2015) that their investigations on the effect of ALS technology on students' performance did not reveal any statistically significant differences (Gebhardt, 2018). In 2020, Cui conducted a study comparing the performance of a large group of students using ALS platform to a smaller group of students, consisting of multiple groups of three students in each group, taught by expert teachers. The results showed that the students in the larger group who were using AI showed significant improvement in their math skills (Wang et al., 2020). In the same study, educators who participated in the research acknowledged the efficacy of ALS platforms. They highlighted how students who utilized these platforms to practice, study, and enhance their comprehension and performance enabled teachers to allocate more attention to those who required additional assistance, which aided teachers in tailoring learning experiences and improving the overall academic success of their students (Wang et al., 2020). According to Kolchenko's (2018) research, using AI technology may have a disadvantage as it can potentially increase the performance gap between high and low achieving students. This is because AI platforms rely heavily on the data provided by students. High achieving students tend to consistently provide more data to the platform by answering questions more frequently, resulting in more favorable outcomes. Therefore, the gap between high and low achieving students may widen (Kolchenko, 2018).

2.3.2 SRL Promotion and Academic Performance

Enhancing academic performance has been a primary concern for policymakers and educators alike. As SRL has been proven to be a keystone in academic success across the literature (Fang et al., 2017; Kosnin, 2007; Xu et al., 2023), several studies have explored the influence of SRL promotion on students' academic success. The scope of these studies has varied, with some concentrating on training students to regulate their learning while others investigating the outcomes of teachers' practices that would promote students' SRL utilization. Training students to self-regulate their learning was claimed to greatly enhance their academic outcomes (Bernacki et al., 2019; Miller & Bernacki, 2019; Pino-Pasternak et al., 2014). Bernacki's (2019) research aimed to evaluate the effects of providing digital training modules on students' proficiency in applying effective learning strategies and SRL principles. The study conducted a comparative analysis of the academic performance of two distinct groups of college students: one group participated in a two-hour digitally delivered training intervention. In contrast, the other group did not receive any training. To establish a baseline for comparison, the study utilized analytics extracted from the LMS prior to the training implementation. These analytics encompassed various parameters, including students' first examination scores, frequency of accessing: educational resources, planning materials, learning objectives checklists, and completion of self-assessment quizzes. The study's findings indicated that the group that completed the training outperformed their counterparts. Additionally, the trained group demonstrated more effective implementation of learning strategies and enhanced time-management skills (Bernacki et al., 2019). The findings of Miller and Bernacki's (2019) study corroborated Bernacki's previous study. Miller & Bernacki

(2019) interesting study aimed to investigate how SRL skills training might impact preparatory math students' learning practices and performance and to what extent this training might yield differences in students' motivation and behavior. This study aimed to evaluate and analyze the behavior, performance, and outcomes of two control groups and an intervention group to enhance SRL skills. The LMS course statistics and ALEKS platform reports were both used to monitor students' exhibited behavior and performance. The study's findings showed that the intervention group, SRL-trained students, completed more topics than the other two groups during the course's first unit and overall. In addition, the trained students demonstrated early access to guided notes and study guides, consistent utilization of digital resources, active monitoring of their progress, and a higher degree of topic mastery, while allocating less time to problem-solving activities on the ALEKS platform (Miller & Bernacki, 2019). Pino's (2014) research, which included two intervention studies, aimed to identify teachers' practices that might promote students' SRL skills and illustrate how these practices can be discharged to design pedagogical interventions that suit primary school students. The implementation of this intervention adopted an interactive approach; the study focused on group tasks strategies as a SRL catalyst factor by investigating the effect of collaborative problem-solving, play, and dialogue on students' SRL capacity. Based on pre-test results, the paper's findings revealed a positive impact of the intervention on students' academic results and SRL skills, particularly those with lower levels of metacognition at the beginning of the study (Pino-Pasternak et al., 2014).

2.3.3 Fostering Student SRL: Teachers' Role

Teachers are believed to have a central position in promoting and supporting students' SRL skills and strategies. Nevertheless, little is known about teachers' practices and knowledge related to instilling students' SRL (Brenner, 2020; Dignath-van Ewijk & van der Werf, 2012; Dignath & Büttner, 2018). The studies conducted to investigate teachers' knowledge and methods to enhance students' SRL capacity and conduct unfolded multifaceted claims, where some studies revealed a serious lack of SRL concepts and practices grasped among teachers, and others acknowledged their knowledge and awareness. According to Burgess (2023), there is a tendency among teachers to conflate self-regulation with self-control in their endeavors to enhance students' ability to handle academic demands, teachers often focus on exerting control over students' emotions and behavior, rather than equipping them with effective strategies to manage their academic tasks effectively. Dignath & Büttner (2018) study, which included video-taped class observations and teachers' interviews, found that K-12 teachers do not have the sufficient SRL related awareness particularly in terms of metacognitive knowledge as a crucial component of SRL. Any exhibited teacher's practices that might be linked to promoting students' SRL capacity was mostly done unintentionally. Dignath & Veenman (2021) systematic review bolstered and went hand in hand with Dignath & Büttner (2018) study claims. On the other hand, Alvi & Gillies (2020) study findings did not agree with the formerly mentioned studies. According to Alvi & Gillies (2020) qualitative study, teachers have a solid perception of the fundamental elements of SRL, allowing them to effectively support their students' SRL growth. The study also connected teachers' approaches to promoting SRL with their beliefs, skills, and drive. However, the research also identified

several obstacles that may hamper teachers' ability to promote SRL, including school policies, the curriculum, time and resource constraints, and the involvement of students' parents and community.

2.3.4 *SRL in Online and ALS Environment*

The absence of student-teacher interaction while using ALS platforms increased the need to ensure students' self-regulatory and autonomy are in place. In order to support students in this endeavour, ALS often incorporates features that promote the development of metacognitive strategies. These strategies, such as self-monitoring, self-assessment, and reflection, are vital to fostering a deep understanding of one's own learning process (Hashim et al., 2022). Few studies were directed toward examining ALS platforms features that would predict or promote students' SRL behaviours (Harati, Sujo-Montes, Tu, Armfield, & Yen, 2021). Molenaar's (2021) investigation of moment-by-moment ALS platform learning curves found that those curves could signal students' SRL skill application during AL interaction, allowing instructors to intervene when necessary. Aleven's (2010) study, on the other hand, restricted the option of monitoring students' SRL skill application to simply the help-seeking skill. While Crosslin's (2018) research found that design restrictions are impediments to the adoption of SRL skills in an online learning setting, other studies endorsed the impact of design on SRL promotion. Li (2022) found that gamified online platforms increase students' SRL interest and competence by attracting them with a sense of challenge and the opportunity to win, thus motivating them to optimize their results voluntarily. Park's study (2022) suggested that the existence of a user interactions analytic dashboard in ALS platforms has a significant impact on learners' employment of SRL skills, with students benefiting from help

seeking, on-spot feedback, and visualization of progress. This progress tracking and outcome assessment empowers learners to better control their own learning, and the feedback and guidance provided by the adaptive system further aid students in enhancing their metacognitive skills, ultimately contributing to their success within ALS context. Devolder (2012) conducted a systematic review that studied the integration of various types of scaffolds within learning platforms. The review aimed to determine the effectiveness of these scaffolds in promoting students' SRL. The findings revealed that most scaffolds are control-phase related, and they were found to be effective in refining students' task strategies.

2.3.5 ALEKS Platform Efficacy and SRL Promotion

ALEKS is one of the most used ALS platforms globally (Cosyn et al. 2021). Hence, there has been a growing interest in studying students' behavior and the impact of ALEKS while interacting with this platform. Sun's (2021) systematic review of ALEKS's impact on K-12 and higher education students' mathematical performance found that using ALEKS positively affects math learning outcomes, both in K-12 and higher education settings. ALEKS showed, as per the meta-analysis, favourable results compared to traditional learning settings; students who used ALEKS showed significant improvements in their math performance, especially in their conceptual understanding and problem-solving skills. These benefits were consistent across various grade levels and student demographics, suggesting that ALEKS could be widely adopted in math education. Integrating ALEKS as an extracurricular activity in mathematics classrooms has yielded improved student conduct and engagement, decreased reliance on teacher support, and allowed teachers to allocate more time towards supporting students with lower academic achievement (Craig et al., 2013). Fang's (2017) study examined

students' persistence while learning a particular task using ALEKS platform. The study showed that three different learning behavior patterns were exhibited. These patterns include individuals who exhibit high persistence and infrequent subject shifting, those who display low persistence and frequent topic shifting, and individuals who demonstrate moderate levels of persistence along with moderate levels of topic changing. Interestingly, no tangible difference in students' academic achievement was observed across the three patterns. Although the findings do not prove a correlation between persistence and academic achievement, they suggest that it plays a role in knowledge acquisition in an AL environment. In a research project that aimed at predicting students' academic performance by analyzing their interactions with ALEKS, seven discrete behaviors were observed: seeking assistance, committing consecutive errors, switching between topics, achieving mastery in topics, revisiting previously mastered subjects, and changes in behavior over time. The results of the study indicated that requesting help and frequently changing subjects were linked to lower levels of academic success, while revisiting previously mastered concepts was identified as a beneficial strategy related to enhanced performance (Xie et al. 2017). In Harati's (2021) study, the focus was on shedding light on ALEKS's role in promoting students' SRL capacity. This study aimed to investigate the extent to which students' SRL skills improved after utilizing the ALEKS platform for three months. To achieve this, a pretest was conducted at the beginning of the academic term, followed by a post-test after the stipulated period. The SRL questionnaire was administered to the students to gauge their level of improvement at both phases. The study's findings revealed a notable reduction in participants' SRL skills. The qualitative part of the study identified the lack of motivation, ALEKS's rigid grading system,

ALEKS's penalties, the complicated nature of the system, and the limited social interaction while interacting with ALEKS platform as the reasons behind this decline. Another study that focuses on SRL promotion while utilizing ALEKS is Barrus' (2013) study. The study examined students' performance under three conditions: traditional classroom instruction, ALS-aided instruction employing ALEKS, and employing ALEKS with providing teachers' with SRL training. The research revealed that there were no statistically significant disparities in SRL abilities, mathematical performance, or motivation among the three groups.

Overall, ALS platforms are of great importance in today's education and have immense potential. Ensuring that students are empowered while interacting with these platforms is crucial to achieving optimal results. Teachers' utilization of this technology to foster students' academic competencies growth is underexplored. This study examines the extent to which educators utilize ALS, ALEKS, tools, and features to promote students' SRL skills and endurance.

Chapter 3: Research Methodology

3.1 Research Design

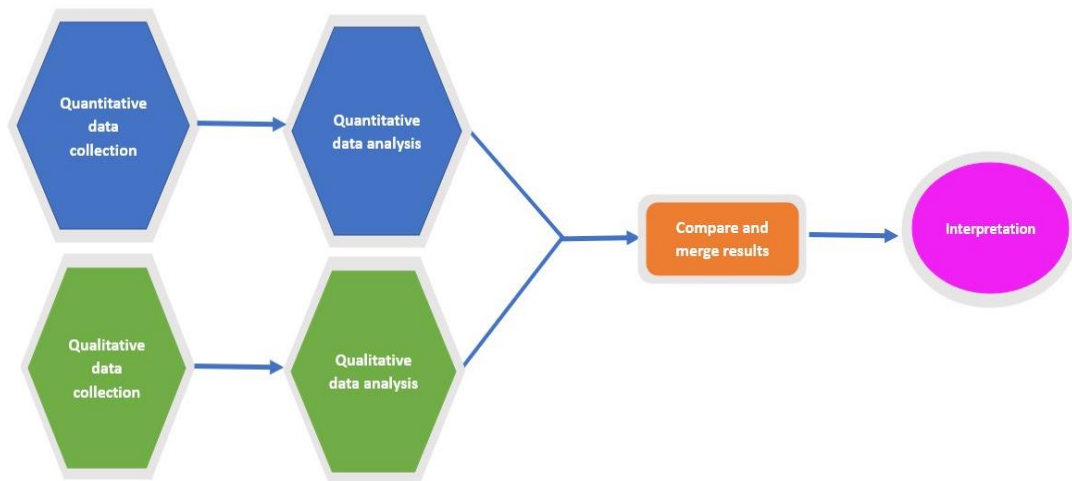
The focus of this study is to investigate teachers' perceptions of the effectiveness of ALEKS features in honing students' SRL skills. Additionally, the study seeks to assess the degree to which teachers are employing ALEKS attributes to enhance students' SRL and their impact on students' SRL outcomes. A mixed-method approach was employed to achieve the study objectives. The mixed method was chosen to leverage the strengths of both quantitative and qualitative approaches while mitigating as many of their limits as possible, resulting in more reliable findings (Williamson, 2002). Additionally, the implementation of a mixed-method approach enables the researcher to triangulate the results, as indicated by Creswell & Creswell (2018). Triangulation, as defined by Williamson (2002), refers to the technique of bolstering the reliability of conclusions by cross-validating the consistency of results by utilizing various data-gathering methods.

Within the realm of mixed method approaches a parallel design was applied in this study. The study incorporated the utilization of a four-part survey and semi-structured interviews to collect data. The first and second sections of the questionnaire targeted acquiring participants' consent to partake in the study and collecting their demographic information. The third part of the questionnaire aimed to gauge ALEKS's effectiveness in promoting students' SRL capacity from teachers' point of view. The fourth part sought to assess the frequency of teachers' implementation of ALEKS practices that are specifically geared to promote students' SRL. The qualitative section of this study aimed to explore the instructional practices utilized by teachers to facilitate SRL enhancement, as well as to understand how teachers can assist

students in crafting the skills and mindset needed for effective SRL promotion while interacting with ALEKS. This qualitative data was acquired by interviewing two teachers who possessed extensive experience in implementing both ALS and ALEKS platforms. Subsequently, the collected data was analyzed separately, and the findings were compared, merged, and integrated to project a more comprehensive view of the captured results.

Figure 10

Parallel Mixed Method Diagram



Note. Malau-Aduli (2023)

Given that the primary goal of the current study was to document teachers' viewpoints on ALEKS's platform features' ability to enhance students' SRL and to examine their practices aimed at directing students toward self-regulatory, and as no hypothesis-generating was intended, descriptive data analysis was the most suitable method to summarize and interpret the collected data. The adoption of this methodology enables a thorough and clear

presentation of the essential features, patterns, central tendencies, and trends inherent in the data, providing an accurate portrayal of the actual situation without necessitating complex statistical analysis or hypothesis testing, making it particularly appropriate to achieve the study's objectives (Williamson, 2002). Additionally, descriptive analysis facilitates the generation of meaningful conclusions as well as the formation of recommendations based on the findings obtained (Kumar, 2008). The research questionnaire's descriptive statistics would represent a quantifiable overview of teachers' perceptions of ALEKS's capacity to promote students' SRL, a measurable perspective on ALEKS SRL promotion impact, as well as the frequency of implementing instructional practices that would contribute to promoting students' SRL capacity.

3.2 Participants Selection

The Emirates School Establishment (ESE) schools were chosen as the primary site to carry out the data collection as ESE implements ALEKS. As stated in ALEKS background section of the literature review (2008), ALEKS is being employed by Mathematics and Chemistry teachers. Accordingly, the questionnaire was administered to teachers within these two disciplines. All the requested requirements and ethical considerations imposed by ESE were meticulously followed and adhered to assure the integrity of the research process. Ethical considerations are elucidated further in the dedicated ethical considerations subsection of this methodology.

3.3 Study Procedure

The initial phase of the study was developing the study instruments, the online questionnaire and the interview questions, then presenting them along with the study

background and rationale to the British University in Dubai (BUID) ethical committee to obtain their approval to commence the study.

After receiving the approval of the BUID ethical committee, the next step was to contact the ESE research team to request permission to conduct the study within the ESE schools. The ESE research team, in turn, asked for an introduction form and a data collection request to be filled and submitted along with a "to whom it may concern" letter and the signed and stamped ethical approval from the university's ethical committee. Additionally, the research team requested that the developed online questionnaire and the interview questions to be submitted in Arabic and English for their approval and consideration. It is noteworthy that the Arabic translation was customized by the ESE. Subsequently, the ESE approval was obtained, and a facilitation letter was issued and circulated among the school principals of ESE schools along with the online survey link. The principals were asked to disseminate the questionnaire to the targeted teachers. Following the survey circulation, ESE has nominated two elite schools to conduct the interviews. However, only one principal has approved the interviews to be conducted on the school premises. A total of 41 participants consented to partake in the online questionnaire, while only two teachers agreed to participate in the interviews. The collected data was then analyzed and interpreted to achieve the study objective.

3.4 Quantitative Method

To comprehensively answer the three research questions, a parallel mixed method was employed: a cross-sectional survey design to collect the quantitative data and semi-structured interviews for the qualitative part. For the quantitative phase of this study Google forms was

employed for collecting the participants' responses online. A comprehensive two-section survey was developed by the researcher. Prior to these sections, the questionnaire included an introductory part that aimed to collect important demographic data about the participants and their consent to participate in the study. This data included information about the teacher's level of education, years of experience, as well as the level, gender and the subject being taught. This information could help in drawing conclusions based on the analyzed data.

The two main parts of the questionnaire were aligned with Zimmerman's SRL Model. The first section aimed to answer the research's first question: 'RQ1: How do teachers perceive the effectiveness of ALEKS features in fostering students' SRL?' The second part of the questionnaire aimed to answer the research's second question: 'RQ2-To what extent are teachers utilizing the features of the ALS platform, ALEKS, to foster students' SRL?' It is worth mentioning that the second part of the survey was initially developed to be answered by students; however, the ESE restricted the scope of the participants to include teachers only; accordingly, the second part of the survey was modified.

To answer the research's third question, 'RQ3-To what extent do the features of ALP, specifically ALEKS, support and enhance students' SRL?' a readily verified questionnaire intended to assess students' SRL capacity and utilization developed by Harati (2021) was planned to be administered to the students as well. However, due to the reasons mentioned earlier, the third research question will be addressed using the data collected from both the survey and the interviews.

3.4.1 Questionnaire Construction

The first part of the questionnaire was designed to tackle the six SRL processes as defined by Zimmerman. It encompassed goal setting, task strategy, self-monitoring, self-evaluation, time management, help-seeking as well as the overall impact of ALEKS. It used a Likert scale to gauge teachers' agreement on the efficacy of ALEKS in promoting students' SRL capacity and skills. The Likert scale used in the study varied based on the nature of the questions being asked, providing a detailed and organized framework for collecting the opinions and insights of teachers. The scale ranged from 'Very Ineffective' to 'Very Effective,' allowing for a quantitative evaluation of how teachers viewed the impact of ALEKS on SRL processes and skills. In addition, other Likert scales were utilized to match the specific question being asked, including 'Strongly Disagree' to 'Strongly Agree,' 'No impact' to 'Substantial impact,' and 'Never' to 'Always'.

Figure 11

Sample of Teachers' Perspective Survey

Teachers' Survey

20002417@student.buid.ac.ae [Switch account](#)

Not shared

* Indicates required question

تستور المعلمين "Teachers' Perception of ALEKS Features and Self-Regulated Learning"
لميزات أليكس وللمهارات التي تعززها في تعزيز التعلم الذاتي المنظم

Question 1

Kindly rate the effectiveness of ALEKS features in fostering the following students' self-regulated learning processes/skills:

Please use the scale below to indicate your response:

تكم فاعلية ميزات منصة ALEKS في تعزيز عمليات ومهارات التعلم المنظم ذاتي للطلاب

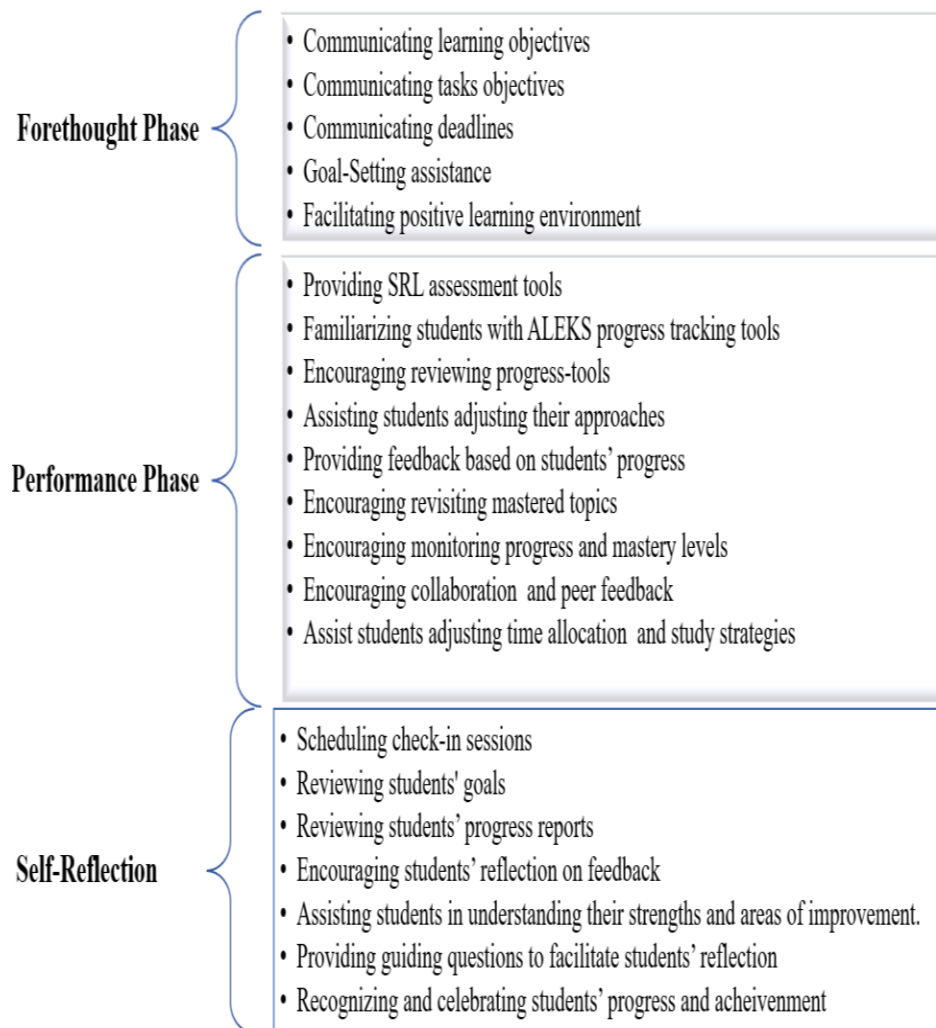
يرجى استخدام المقاييس أدناه للإشارة إلى إجابتك

	Very Ineffective غير فعالة جدًا	Ineffective غير فعالة	Neutral محايدة	Effective فعالة	Very Effective فعالة جدًا
Goal-setting تحديد الأهداف	☐	☐	☐	☐	☐
Progress tracking متابعة تقدم الطالب	☐	☐	☐	☐	☐

The second part of the questionnaire aimed to assess the extent to which teachers employ ALEKS's features to cultivate students' SRL mindset and strategies. A Likert scale questionnaire that would examine the frequency with which teachers utilize instructional methodologies tailored to promote students' SRL was devised. These practices were derived from the suggested approaches proposed by Kitsantas & Dabbagh (2010). In their book "Learning to Learn with Integrative Learning Technology," Kitsantas & Dabbagh presented a set of practices that should assist educators in adopting pedagogical approaches that would foster students' SRL while integrating technology. Some of these practices include assisting students in identifying learning goals, communicating lessons' objectives via educational platforms, and familiarizing students with the platform-integrated planning and progress-monitoring tools such as the calendar and the progress tracking tools, and other practices that were modified to fit the ALS utilization context. These practices were categorized and mapped to Zimmerman's SRL Model and were employed to examine the frequency with which teachers implemented these recommended practices to promote students' SRL capacity. Figure 12 shows the examined practices. Figure 13 represents a sample of teachers' practice questionnaire. The questionnaire is enclosed in Appendix A.

Figure 12

Teachers' Suggested Practices Mapped to Zimmerman's Model



3.4.2 Validating the Questionnaire

To examine the validity of the developed questionnaire, the questionnaire was administered to a group of educators who are either Ph.D. holders or Ph.D- pursuing for their substantial research expertise which would led more legitimacy to the data collection instrument. Their feedback on the survey questions and structure was considered, and their suggestions were implemented.

3.5 Qualitative Method

For the qualitative part of the study, semi-structured interviews were conducted. The interview consisted of 13 questions specifically designed to get in-depth insights into how teachers are incorporating ALEKS into their lesson planning and delivery in a manner that would promote their students' SRL. Furthermore, this part aimed to evaluate the extent to which ALEKS features could support their endeavours in this regard. Additionally, the questionnaire administered for the quantitative data collection included an open-ended field for participants to share their insights in light of the study context. Some of the participants' insights were considered as well.

ESE has nominated five teachers with recognized educational technology implementation experience, two of whom consented to participate in the interviews. The interviews were conducted face-to-face at the school where they teach after getting the necessary permission from the school principal. The interviews were recorded and transcribed. The transcriptions were presented to the participants to get their consent to use their responses in the study. Manual thematic analysis was subsequently applied to the transcribed data to identify recurring themes and patterns in teachers' responses. This method was chosen as it

suits the descriptive data analysis approach this study adopts (Cohen, Manion, & Morrison, 2018). Interview questions can be found in Appendix B. Appendix C includes the transcribed interviews in Arabic with English translation.

3.6 Data Analysis

The study adopted a mixed-method approach. The data collected via the administered questionnaire and the interviews would be employed to conduct descriptive data analysis. A total of 41 participants completed the online questionnaire. The quantitative data was analyzed using Jamovi software. This step aimed to extract the essential data characteristics, such as the mean and the standard deviation, which can be used to visualize the main features of the dataset in a way that will describe the current usage and implementation of ALEKS features.

On the qualitative side, manual thematic analysis was employed. The verbal data collected during the two interviews was scrutinized to look for recurring patterns and themes, which were segmented and coded to understand teachers' fundamental insights and perspectives. The performed thematic analysis is enclosed in Appendix D.

The findings from the two approaches of the study were integrated to give a comprehensive understanding that might fulfill the study objectives and provide answers to the research questions.

3.7 Ethical Considerations

The study strictly adhered to the ethical regulations set by BUiD and ESE throughout collecting, processing, and reporting data. Permission from the university research ethics committee was requested and acquired before starting. The ethical approval was presented along with all the requested documents to the ESE research team. ESE approval was received

before any implementation. Participants' approval to participate in the study was obtained and documented. Each participant was fully aware of the research purpose and procedure, and participants' confidentiality was totally protected throughout the study. For the qualitative portion of the study, the transcribed interview responses were presented to the participants, and their approval to proceed with the study using their inputs was sought. The participants were informed of their right to withdraw from the study at any time. Appendix E, F, and G for reference.

Chapter 4: Data Analysis and Results

To address the research questions, a parallel mixed-method approach was adopted. A quantitative approach, an online questionnaire, and a qualitative approach, semi-structured interviews, were employed. This chapter outlines the key findings obtained by utilizing this methodology.

4.1 Quantitative Results

For the quantitative section, a questionnaire that was created using Google Forms and constructed to cover the six SRL skills defined by Zimmerman was administered. A total of 46 responses were received, 5 of which were excluded after data cleaning, leaving 41 responses to be analyzed with the aid of Jamovi software. The questionnaire encompasses four sections; the first section is dedicated to documenting participants' consent to partake in the study, the second section gathers participants' demographic information, the third section aims to capture teachers' opinions on ALEKS's SRL promotion efficacy, and lastly, and the fourth section examines the frequency with which teachers are utilizing practices that are believed to cultivate students' self-regulatory and autonomy. The fourth section was concluded with an open-ended request for any additional insights.

4.1.1 Demographic Information

The demographic investigation covered participants' gender, discipline, teaching level, educational level, and school type. An overall of 46 teachers answered the questionnaire, 41 of which have their inputs considered for the study, consisting of 29 females (70.7%) and 12 males (29.3%), 27 Mathematics teachers (65.9%), 12 Chemistry teachers (29.3%), and 2 General Science teachers (4.9%), ten teachers work in boys' schools (24.4%), 26 work in girls'

schools (63.4%), and five teachers work in co-educational schools (12.2%). The participants' educational levels were as follows: one PhD (2.4%) holder, one PGCE (2.4%) holder, 21 Bachelor's degree holders (51.2%), and 18 Master's degree (43.9%) holders. Regarding teaching experience distribution, one teacher has less than one year of teaching experience (2.4%), 8 have 1 to 5 years of teaching experience (19.5%), 13 have 6 to 10 years of teaching experience (31.7%), 7 have 11 to 15 years of experience (17.1%), and 12 have 16 or more years of experience. Table 2 presents the participants' demographic information distribution.

Table 2

Teachers' Demographic Information

Participant	Frequency	Percentage
Gender		
Female	29	70.70%
Male	12	29.30%
School Type		
Boys' school	10	24.40%
Co-educational school	5	12.20%
Girls' school	26	63.40%
Teaching Level		
Cycle 2 (Grade 5 to Grade 8)	17	41.50%
Cycle 3 (Grade 9 to Grade 12)	24	58.50%
Years of Teaching Experience		
1-5 Years	8	19.50%
6-10 Years	7	17.10%
11-15 Years	13	31.70%

16 years or more	12	29.30%
Less than one year	1	2.40%
Subject		
Chemistry	12	29.30%
General Sciences	2	4.90%
Mathematics	27	65.90%
Educational Level		
PGCE	1	2.4 %
Bachelor's Degree	21	51.2 %
Master's Degree	18	43.9 %
PhD	1	2.4 %

4.1.2 Teacher's Perspective

This section of the questionnaire aims to assess teachers' perceptions and insights on ALEKS's features capability and impact to promote students' SRL and elevating their autonomy. An eight-question survey that evaluates teachers' opinions and beliefs was administered to address this inquiry. The survey items tackle the six SRL skills and their expected impact, as well as the overall effectiveness of ALEKS in fostering students' SRL and autonomy as per teachers' standpoints.

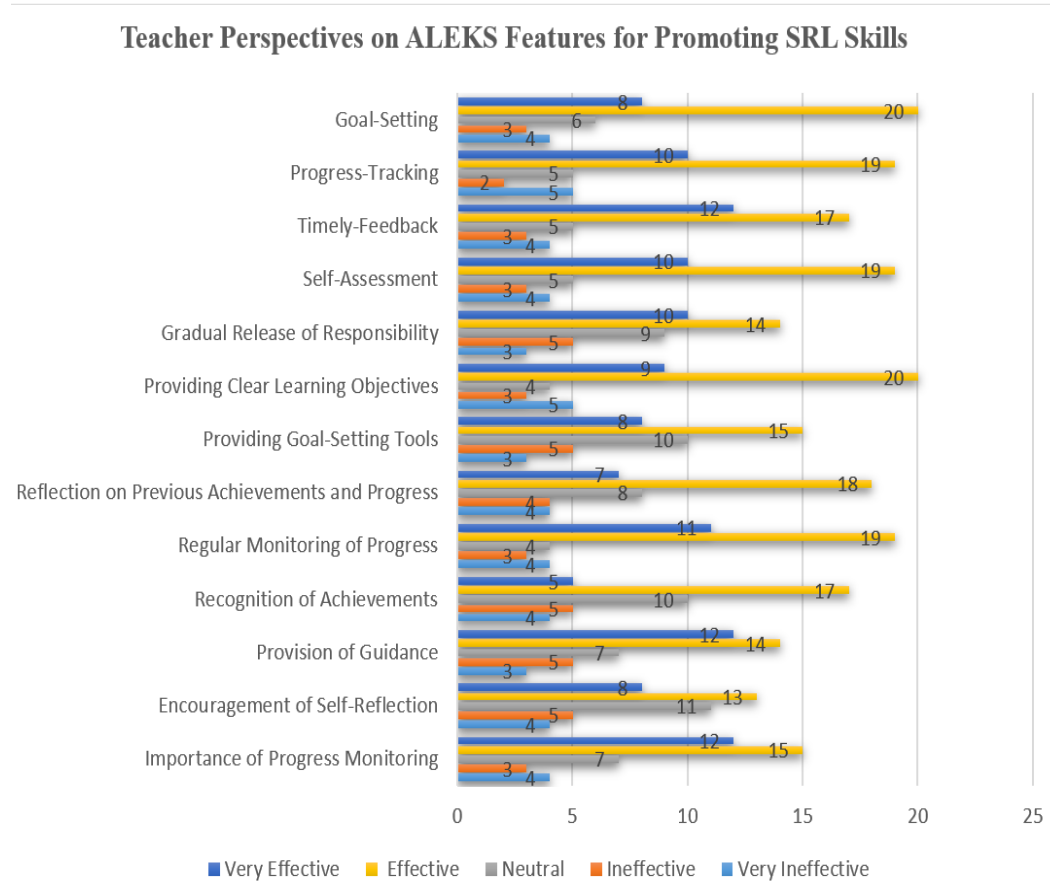
The first question aims to examine if ALEKS platform tools are sufficient to cultivate students' SRL skills, processes, and conduct. The question included 13 aspects that are believed to be essential for students to acquire self-regulatory. Teachers' responses are presented in Table 3.

Table 3*Q1 Answers*

SRL Skills and Process	Very Ineffective		Ineffective		Neutral		Effective		Very Effective		N
<u>Goal-Setting</u>	4	9.8 %	3	7.3 %	6	14.6 %	20	48.8 %	8	19.5 %	41
Progress-Tracking	5	12.2 %	2	4.9 %	5	12.2 %	19	46.3 %	10	24.4 %	41
Providing Timely-Feedback	4	9.8 %	3	7.3 %	5	12.2 %	17	41.5 %	12	29.3 %	41
Self-Assessment	4	9.8 %	3	7.3 %	5	12.2 %	19	46.3 %	10	24.4 %	41
Facilitate Gradual Release of Responsibility	3	7.3 %	5	12.2 %	9	22.0 %	14	34.1 %	10	24.4 %	41
Communicating Clear Learning Objectives	5	12.2 %	3	7.3 %	4	9.8 %	20	48.8 %	9	22.0 %	41
<u>Providing Goal-Setting Tools</u>	3	7.3 %	5	12.2 %	10	24.4 %	15	36.6 %	8	19.5 %	41
Reflection on Previous Achievements and Progress	4	9.8 %	4	9.8 %	8	19.5 %	18	43.9 %	7	17.1 %	41
Regular Monitoring of Progress	4	9.8 %	3	7.3 %	4	9.8 %	19	46.3 %	11	26.8 %	41
Recognition of Achievements	4	9.8 %	5	12.2 %	10	24.4 %	17	41.5 %	5	12.2 %	41
Provision of Guidance	3	7.3 %	5	12.2 %	7	17.1 %	14	34.1 %	12	29.3 %	41
Encouragement of Self-Reflection	4	9.8 %	5	12.2 %	11	26.8 %	13	31.7 %	8	19.5 %	41
Importance of Progress Monitoring	4	9.8 %	3	7.3 %	7	17.1 %	15	36.6 %	12	29.3 %	41

Figure 14

Teachers' Perspectives Clustered Bar Representation



To statistically analyze teachers' inputs, the responses were assigned values from 1 to 5, where 1 corresponds to very ineffective, and 5 corresponds to very effective. The analysed data is presented in Table 4.

Table 4*Q1 Statistical Analysis*

SRL Skill and Items	N	Mean	Median	SD
Goal-Setting	41	3.61	4	1.18
Progress-Tracking	41	3.66	4	1.26
Providing Timely-Feedback	41	3.73	4	1.25
Self-Assessment	41	3.68	4	1.21
Gradual Release of Responsibility	41	3.56	4	1.21
Providing Clear Learning Objectives	41	3.61	4	1.26
Providing Goal-Setting Tools	41	3.49	4	1.16
Reflection on Previous Achievements and Progress	41	3.49	4	1.19
Regular Monitoring of Progress	41	3.73	4	1.23
Recognition of Achievements	41	3.34	4	1.15
Provision of Guidance (help seeking)	41	3.66	4	1.24
Encouragement of Self-Reflection	41	3.39	4	1.22
Importance of Progress Monitoring	41	3.68	4	1.25

Question 2 assesses teachers' agreement about ALEKS's overall effectiveness in promoting students' SRL. The results show a general agreement among teachers that ALEKS has the capacity to promote students' SRL, as 56.1% agree with the statement and 14.6% strongly agree. A total of 24.4% adopted a neutral standpoint, which might indicate a

considerable degree of indecision. However, 2.4% disagreed, and the same percentage, 2.4%, strongly disagreed.

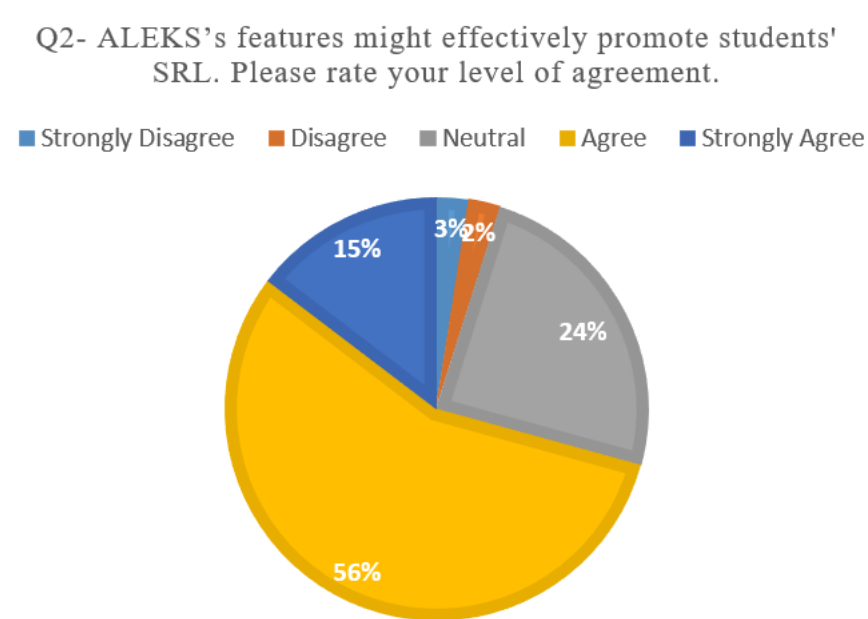
Table 5

Q2 Statistical Analysis

Q2- ALEKS's features might effectively promote students' SRL. Please rate your level of agreement.	Counts	% of Total
Strongly Disagree	1	2.4 %
Disagree	1	2.4 %
Neutral	10	24.4 %
Agree	23	56.1 %
Strongly Agree	6	14.6 %

Figure 15

Q2 Statistical Analysis



The third question evaluates teachers' assessment of the impact of ALEKS's features on students' SRL outcomes. Most of the responses were positive, delineated as 46.3% high impact, 34.1% moderate impact, and 7.3% very high impact. While a minority of participants reported low impact, 12.2%, and no inputs were recorded for no impact.

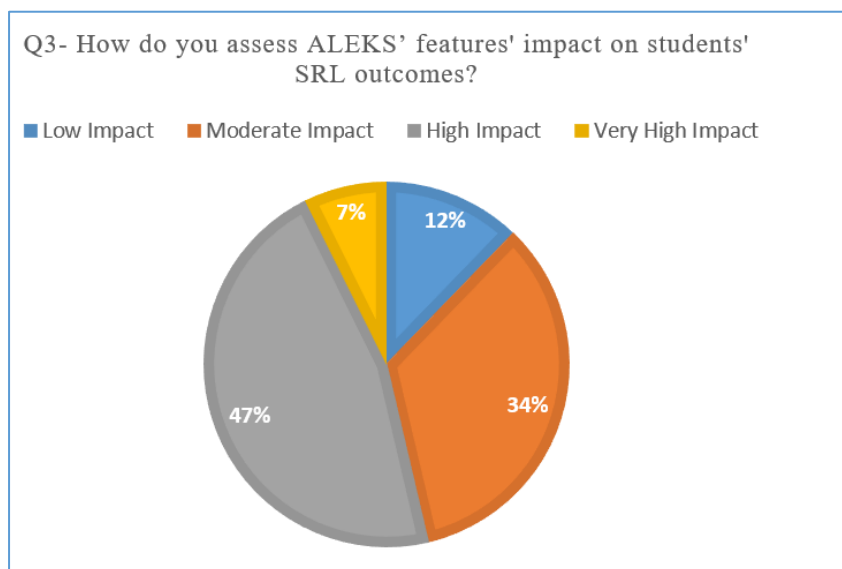
Table 6

Q3 Statistical Analysis

Q3- How do you assess ALEKS' features' impact on students' SRL outcomes such as goal-setting, time management, etc?	Counts	% of Total
Low Impact	5	12.2 %
Moderate Impact	14	34.1 %
High Impact	19	46.3 %
Very High Impact	3	7.3 %

Figure 16

Q3 Statistical Analysis



Question 4 examined how often teachers encourage their students to leverage ALEKS's features for their SRL development. A significant number of responses indicated a frequent level of encouragement as a single respondent, 2.4%, reported a low level of implementation "Rarely." And no input was reported for "Never".

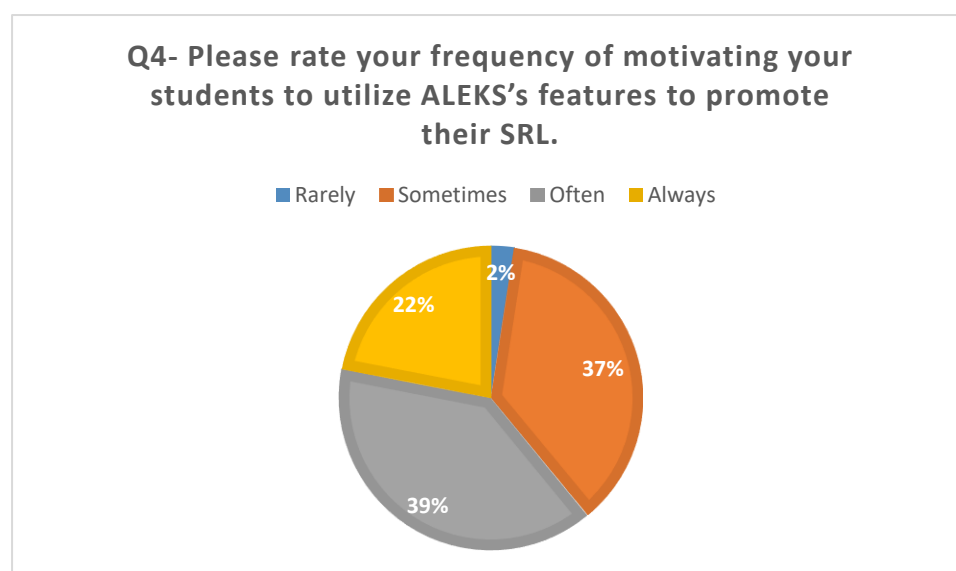
Table 7

Q4 Statistical Analysis

Q4- Please rate your frequency of motivating your students to utilize ALEKS's features to promote their SRL.	Counts	% of Total
Rarely	1	2.4 %
Sometimes	15	36.6 %
Often	16	39.0 %
Always	9	22.0 %

Figure 17

Q4 Statistical Analysis



Question 5 measures the frequency with which teachers utilize strategies to direct their students toward using ALEKS's features to regulate their learning. The results indicated that 41.5% of the participants reported a moderated level of frequency "sometimes". More than half of the participants reported a high level of implementation, 34.1% reported "often," 17.1% reported "always" utilization. While 7.3% reported a rare level of implementation

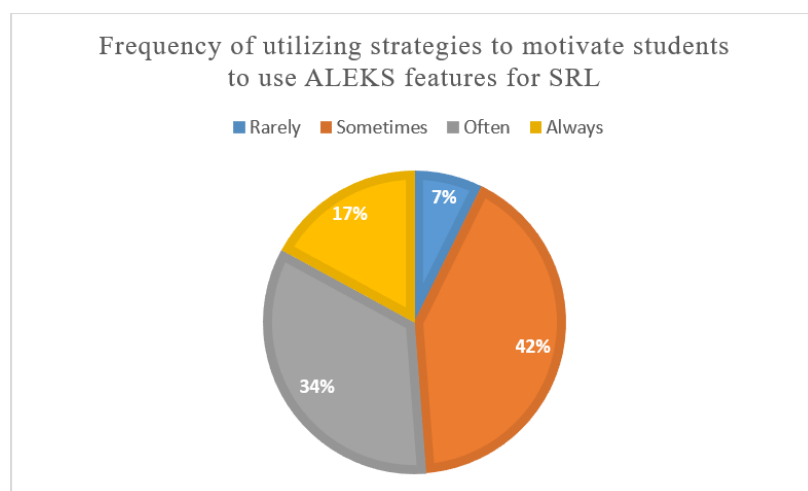
Table 8

Q5 Statistical Analysis

Q5- Please rate your frequency of utilizing strategies to motivate students to use ALEKS features for SRL	Counts	% of Total
Rarely	3	7.3 %
Sometimes	17	41.5 %
Often	14	34.1 %
Always	7	17.1 %

Figure 18

Q5 Statistical Analysis



Question 6 aims to evaluate teachers' opinions regarding ALEKS's features' capability of providing scaffolding support to students' learning process. The response showed that 56.1% agreed with the statement, 22.0% strongly agreed, 19.5% reported neutral responses, and one respondent, 2.4%, reported disagreement. No strong disagreement was reported.

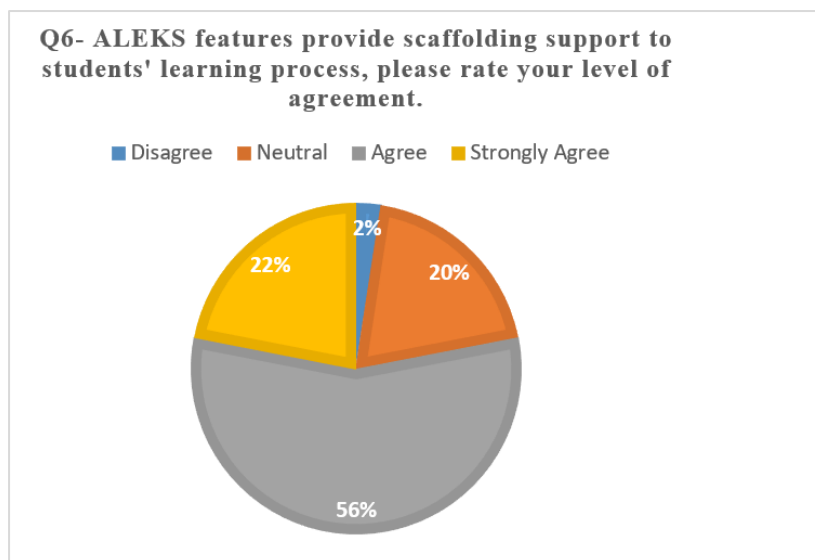
Table 9

Q6 Statistical Analysis

Q6- ALEKS features provide scaffolding support to students' learning process. Please rate your level of agreement.	Counts	% of Total
Disagree	1	2.4 %
Neutral	8	19.5 %
Agree	23	56.1 %
Strongly Agree	9	22.0 %

Figure 19

Q6 Statistical Analysis



Question 7 examines teachers' perceptions of ALEKS's features' capacity to promote students' autonomy. The findings showed that 53.7% of participants agreed with the statement, 22.0% strongly agreed, 19.5% were neutral, and two participants, 4.9%, disagreed. While no strong disagreement was reported.

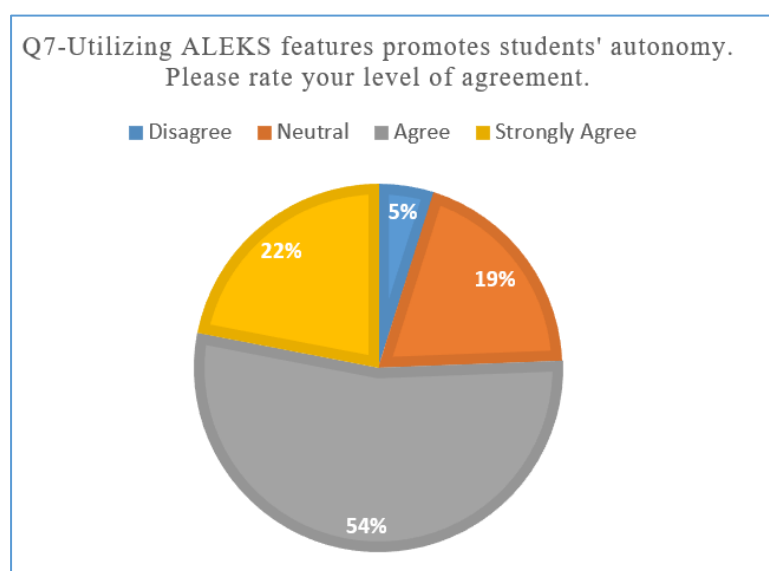
Table 10

Q7 Statistical Analysis

Q7-Utilizing ALEKS features promotes students' autonomy. Please rate your level of agreement.	Counts	% of Total
Disagree	2	4.9 %
Neutral	8	19.5 %
Agree	22	53.7 %
Strongly Agree	9	22.0 %

Figure 20

Q7 Statistical Analysis



The final question in this section examined the extent to which teachers believe that ALEKS features can be enhanced to better support students' SRL. The finding revealed that 78.1 % agree or strongly agree with this notion. 17.1% were neutral, and 4.9% disagreed.

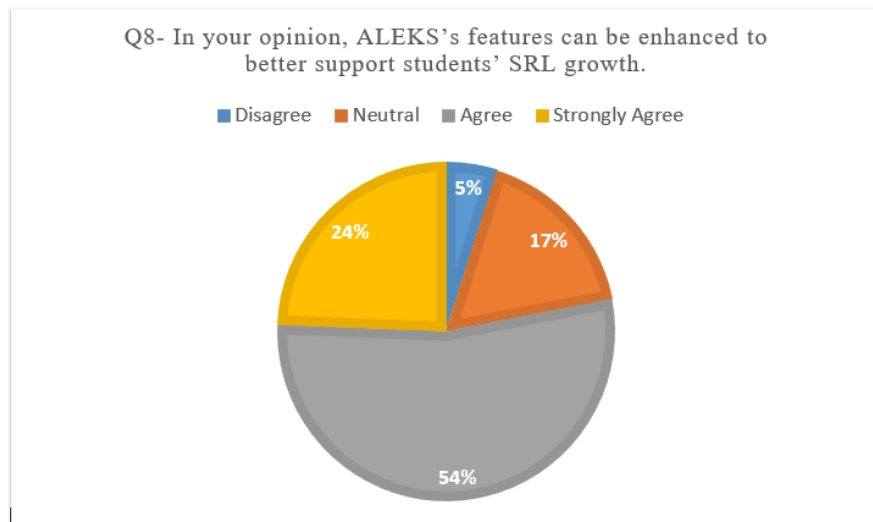
Table 11

Q8 Statistical Analysis

Q8- In your opinion, ALEKS's features can be enhanced to better support students' SRL growth.	Counts	% of Total
Disagree	2	4.9 %
Neutral	7	17.1 %
Agree	22	53.7 %
Strongly Agree	10	24.4 %

Figure 21

Q8 Statistical Analysis



It is important to note that to perform the statistical analysis, the employed rating system assigned the responses values from 1 to 5, where 1 represents the most negative responses,

such as “strongly disagree”, and “no impact.” “never,” etc., and a value of 5 indicates the most positive response, “strongly agree,” “very high impact,” “always,” and so on.

4.1.3 Teachers’ Implementation

The fourth section of the questionnaire seeks to measure the extent to which teachers utilize ALEKS’s features to orient students toward employing and gaining SRL skills. The questionnaire examined 21 practices derived from Kitsantas & Dabbagh (2010) book that are claimed to promote students’ SRL. The teachers were requested to report the frequency with which they integrate these practices into their pedagogical approaches using a five-point frequency Likert scale with the responses (Never 1, Rarely 2, Sometimes 3, Often 4, Always 5). The practices are labelled P1 to P21.

As learners have to undergo three phases in the self-regulation process: the forethought phase, the performance phase, and the self-reflection phase, as suggested by Zimmerman’s SRL Model (Zimmerman & Zimmerman, 2010), the surveyed practices were grouped and matched to this model’s three phases. This classification aims to assess the degree to which the findings of this questionnaire align with previous research.

4.1.3.1 Forethought Phase: Task Analysis and Self-Beliefs Practices

The questionnaire investigated five practices that are tailored to the forethought phase, practices that involve cognitive processes and are associated with the initial stages of learning and would direct students to set learning goals and plans. The findings unveiled that, in general, the instructors demonstrated a high frequency of implementation of the examined techniques. More than 65% of the participants reported highly frequent utilization of these practices, “always” or “often.” Figure 18 shows a stacked bar presentation of each practice frequency as reported by teachers.

Figure 22

Forethought Practices Frequency Distribution

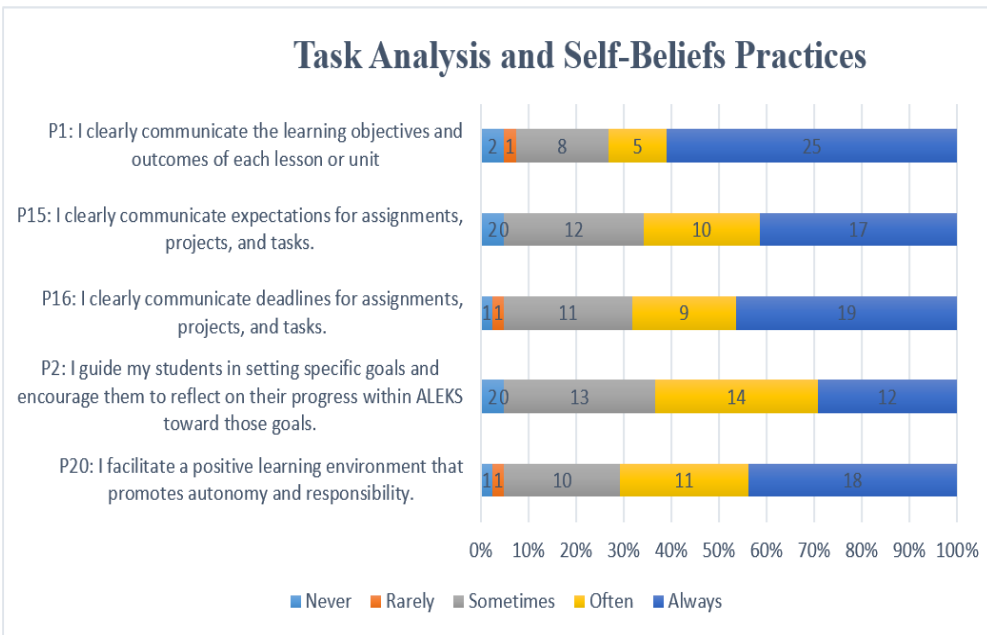


Table 12*Forethought Practices Frequency Distribution*

		Never		Rarely		Sometimes		Often		Always	
P1	I clearly communicate the learning objectives and outcomes of each lesson or unit.	2	4.9%	1	2.4%	8	19.5%	5	12.2%	25	61.0%
P2	I motivate my students to set their goals and guide them to assess their progress in ALEKS toward those goals.	2	4.9%	0	0	13	31.7%	14	34.1%	14	34.1%
P15	I clearly communicate my expectations for each assignment, project, and task.	2	4.9%	0	0	12	29.3%	10	24.4%	17	41.5%
P16	I clearly communicate deadlines for assignments, projects, and tasks.	1	2.4%	1	2.4%	11	26.8%	9	22.0%	19	46.3%
P20	I create a positive learning environment that cultivates students' autonomy and responsibility	1	2.4%	1	2.4%	10	24.4%	11	26.8%	18	43.9%

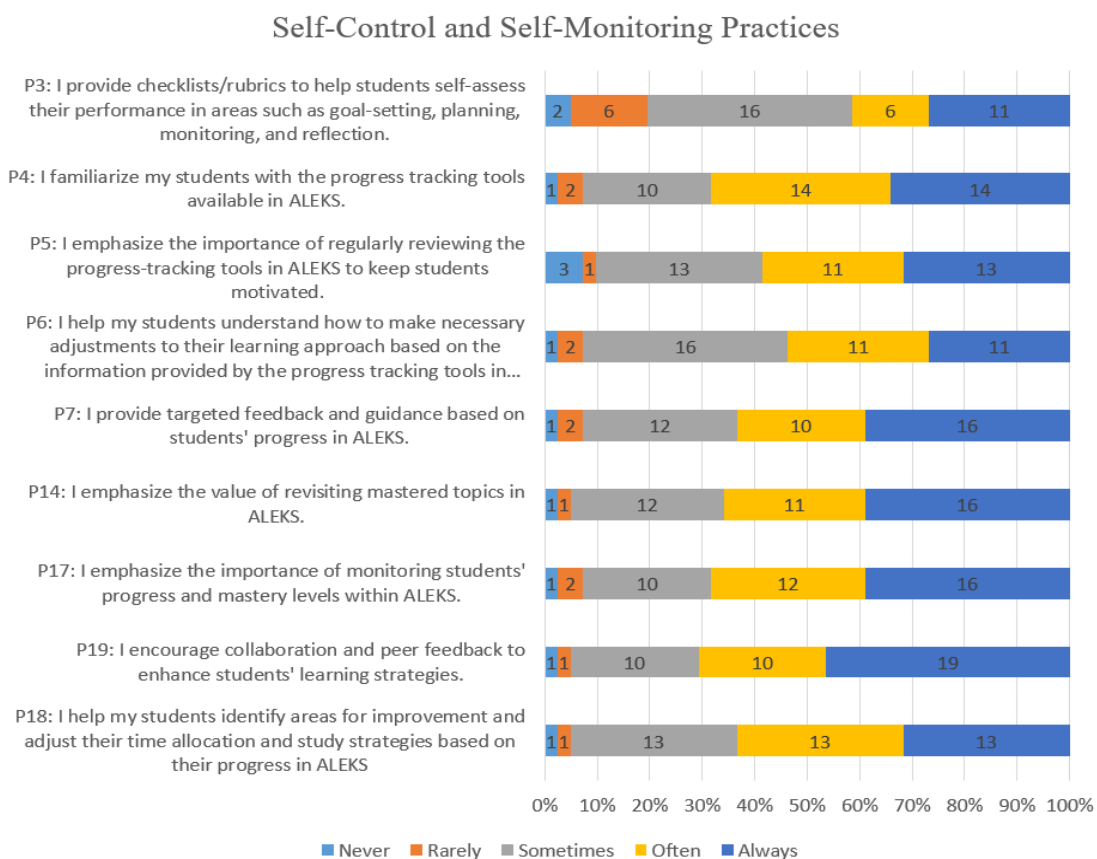
4.1.3.2 Performance Phase: Self-Control and Self-Monitoring Practices The

questionnaire examined nine practices related to the performance phase. The performance phase represents the actual execution of a task. The phase where learners adopt task strategies.

Overall, the reported frequency varied across the instructional practices. Some practices were implemented very frequently with over 65% of respondents integrating them "always" or "often," as seen in P4, familiarizing students with ALEKS progress tools, P14, encouraging students to revisit mastered topics, P17, encouraging students to monitor their progress and mastery levels in ALEKS, and P19, encouraging collaboration and peer feedback. Whilst some practices witnessed less frequent implementation with less than 60% reporting "often" or "always" as seen in P3, P5 and P6. Figure 21 shows the stacked bar presentation.

Table 13*Performance Phase Practices Frequency Distribution*

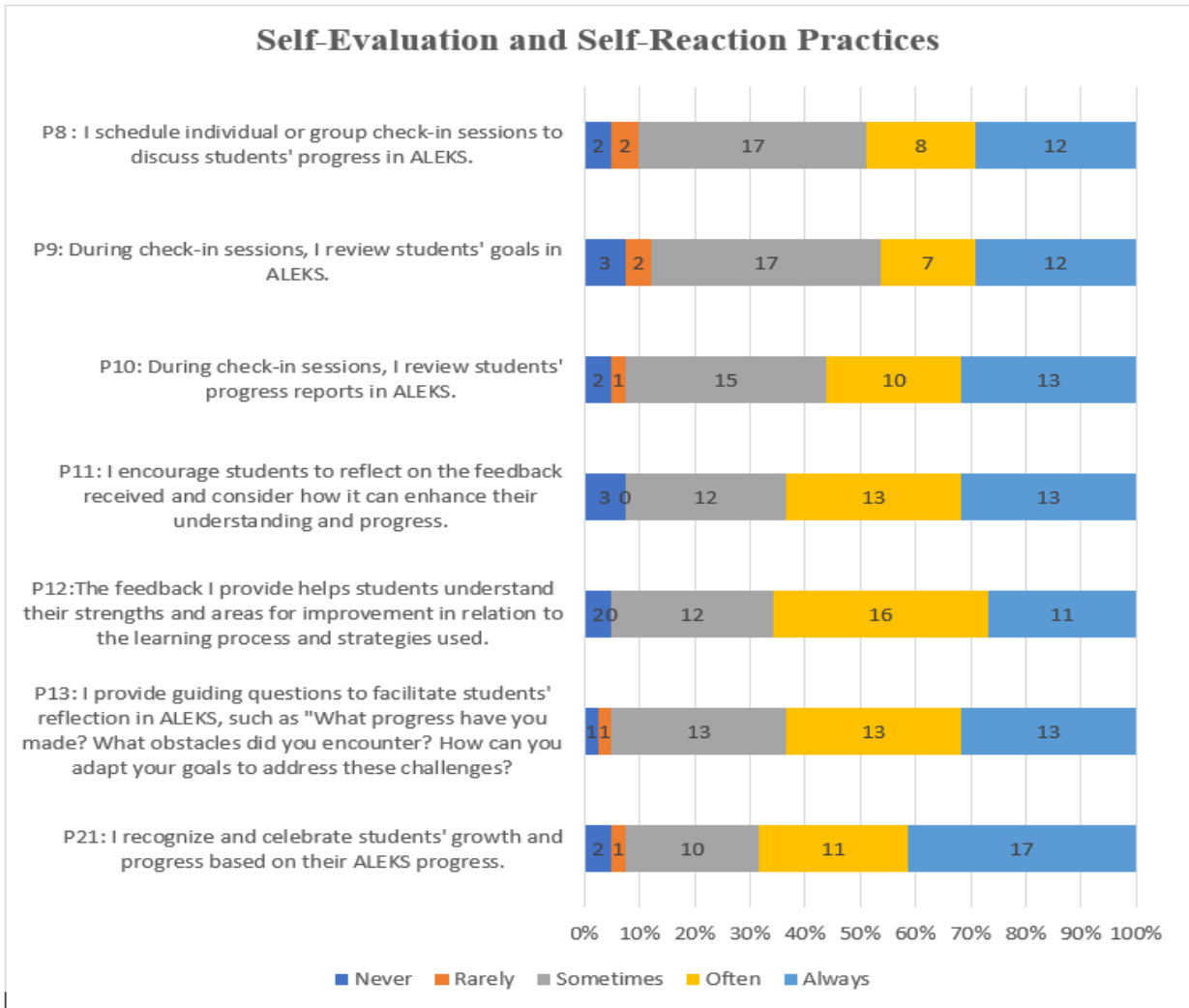
		Never		Rarely		Sometimes		Often		Always	
P3	I provide checklists/rubrics to help my students to evaluate their implementation of SRL process such as goal setting, planning, monitoring, and time management.	2	4.9%	6	14.6%	16	39.0%	6	14.6%	11	26.8%
P4	I familiarise my students with ALEKS progress-tracking tools.	1	2.4%	2	4.9%	10	24.4%	14	34.1%	14	34.1%
P5	I encourage my students to regularly review ALEKS progress-tracking tools.	3	3.7%	1	2.4%	13	31.7%	11	26.8%	13	31.7%
P6	I guide my students to adjust their learning approach based on the data provided by ALEKS progress tracking tools.	1	2.4%	2	4.9%	16	39.0%	11	26.8%	11	26.8%
P7	I provide feedback and guidance based on students' progress in ALEKS.	1	2.4%	2	4.9%	12	29.3%	10	24.4%	16	39.0%
P14	I encourage my students to revisit the mastered topics on ALEKS and emphasize the value of this practice.	1	2.4%	1	2.4%	12	29.3%	11	26.8%	16	39.0%
P17	I encourage my students to monitor their progress and mastery levels in ALEKS.	1	2.4%	2	4.9%	10	24.4%	12	29.3%	16	39.0%
P18	I help my students identify areas for improvement and adjust their time allocation and study strategies based on their progress in ALEKS.	1	2.4%	1	2.4%	13	31.7%	13	31.7%	13	31.7%
P19	I encourage collaboration and peer feedback to enhance students' learning strategies.	1	2.4%	1	2.4%	10	24.4%	10	24.4%	19	46.3%

Figure 23*Performance Phase Practices Frequency Distribution*

4.1.3.3 Self-Reflection: Self-Evaluation and Self-Reaction Practices The survey explored seven practices pertaining to the self-reflection phase. The phase in which learners evaluate their performance against their goals or pre-set standards. As was observed in the previous two phases, the results indicate a diverse level of implementation. Some practices witnessed less frequent implementation. For instance, P8, P9, and P10 which are related to arranging check-in sessions and reviewing students' goals and progress during these sessions, around 50% or less of the participants "always" or "often" adopt this strategy. Whereas P12, providing feedback that helps students understand the points of strength and fragility in their learning processes, and P21, celebrating students' growth based on their progress in ALEKS, were reported to have a highly frequent implementation, more than 65% reporting "always" or "often". Figure 22 shows a stacked bar presentation of each practice frequency as reported by teachers.

Table 14*Self-Reflection Phase Practices Frequency Distribution*

		Never		Rarely		Sometimes		Often		Always	
P8	I arrange individual or group check-in meetings to discuss the progress of my students in ALEKS.	2	4.9%	2	4.9%	17	41.5%	8	19.5%	12	29.3%
P9	I review students' goals during check-in sessions.	3	3.7%	2	4.9%	17	41.5%	7	17.1%	12	29.3%
P10	I review students' progress reports in ALEKS during check-in sessions.	2	4.9%	1	2.4%	13	31.7%	10	24.4%	13	31.7%
P11	I encourage my students to reflect on my feedback and consider how it can enhance their understanding and progress.	3	3.7%	0	0	12	29.3%	13	31.7%	13	31.7%
P12	I provide feedback that helps my students understand their strengths and areas for improvement related to the employed learning process and strategies.	2	4.9%	0	0	12	29.3%	16	39.0%	11	26.8%
P13	I provide my students with guiding questions that prompt reflection in ALEKS, such as, "What progress have you made? What challenges have you encountered? How can you adjust your goals to overcome these challenges?"	1	2.4%	1	2.4%	13	31.7%	13	31.7%	13	31.7%
P21	I acknowledge students' growth based on their ALEKS progress.	2	4.9%	1	2.4%	10	24.4%	11	26.8%	17	41.5%

Figure 24*Self-Reflection Phase Practices Frequency Distribution***4.2 Qualitative Results**

For the qualitative section of the study, semi-structured interviews were conducted.

Additionally, the questionnaire administered for the quantitative data collection included an

open-ended field for participants to share their insights in light of the study context. The inputs of three participants were considered.

ESE has nominated five teachers with a proven track record of high ICT integration experience to participate in the interview. However, only two teachers agreed to take part in the study. Table 16 presents participants' demographic information.

Table 15

Interviewees' Demographic Information

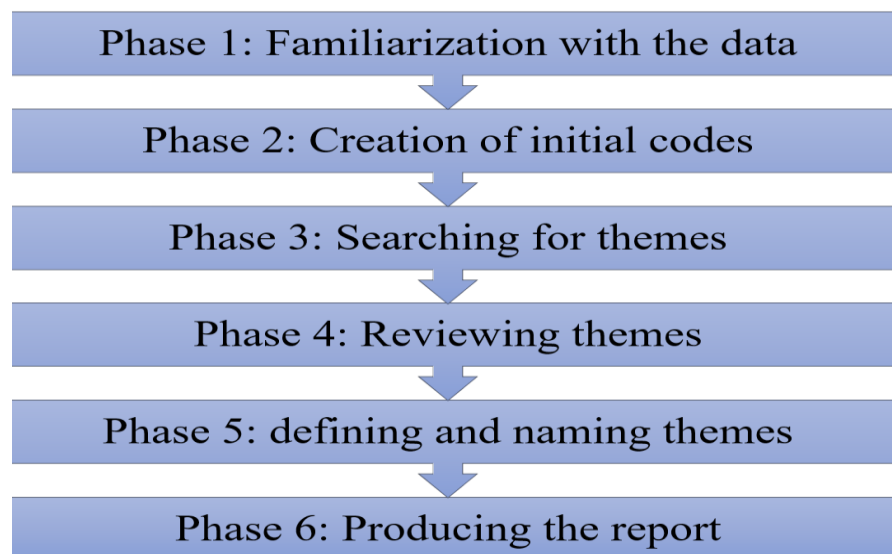
	Gender	Age Group	Subject	Years of Teaching Experience	Educational Level	Teaching Level
Teacher 1	Male	36 - 40	Chemistry	11-15 Years	Master's Degree	Cycle 3 (Grade 9 to Grade 12)
Teacher 2	Male	25 - 30	Mathematics	1 – 5 Years	Bachelor's Degree	Cycle 3 (Grade 9 to Grade 12)

The interview consisted of 13 questions and the interviewees were asked to elaborate wherever possible. The interviews were conducted face-to-face, in Arabic, at the school premises. Each interview lasted for approximately 20 minutes. Participants' responses were transcribed verbatim and then translated into English. Manual thematic analysis was employed, the six-phase thematic analysis outlined by Braun & Clarke (2006), to extract any valuable insight that would serve the study objective. The analysis of the mustered responses focused on the core goal of the study, examining ALEKS's capability to facilitate students' SRL and autonomy, in addition to assessing teachers' implementation of these features within

this framework. The inputs of the open-ended field were included and analyzed too. The analysis unveiled ten main themes. Presented in Table 17.

Figure 25

Braun & Clarke Thematic Analysis



Note. Braun & Clarke (2006)

Table 16

Generated Themes

Theme	Sample of quotes
1- Students' independent learning and autonomy.	Teacher 1: <i>"The feature that I find most compelling in ALEKS is the assignments, as the student solves these assignments on his own."</i> Teacher 2: <i>"As ALEKS trains the student to solve these questions himself, as the solution to these questions cannot be found simply by using a calculator or searching for the answer using the Internet."</i>

-
- 2- Student progress and comprehension status via reports.
- Teacher 1: *“Student progress reports are necessary for the teacher to follow up on so that he can know the student’s progress.”*
- “The reports feature also enables us to see the student’s exact level.”*
- Teacher 2: *“I describe the platform as its primary goal to evaluate the student at multiple stages during his curriculum study.”*
- Teacher 4: *“It is equally important to highlight the pivotal role of the educator in using the reporting functionalities in ALEKS to enhance and deepen students’ learning.”*
- 3- Motivation and challenge.
- Teacher 1: *“the feature of badges and rewards linked to the student’s progress motivated the student to continue performing ALEKS exercises and complete all the required tasks.”*
- Teacher 2: *“As for ALEKS Pie, it positively impacted the students, as I found that they liked this challenge, and it has achieved continuous progress in the student’s level and attainment in the long term.”*
- Teacher 3: *“It is generally the higher achieving students who like using ALEKS and REVEAL because it gives them more of a challenge.”*
- 4- Frustration and flexibility.
- Teacher 1: *“student perceives some of ALEKS’s traits as challenging when it comes to achieving a high score on the progress tracking scale.”*
- “Students faced a problem in ALEKS for Chemistry, especially in asking the student to write the final result using (significant figure). This caused concern for the student from ALEKS, as the student’s complete answer was considered incorrect due to tenths of a percentage.”*
- “The exact responses ALEKS demands can present a challenge.”*
- Teacher 2: *“as ALEKS platform sometimes requires a specific and accurate answer for each question, meaning there is no flexibility in solving mathematical problems. If the student does*

not provide the correct final result, the entire question mark will be deducted."

Teacher 3: *"because ALEKS is not just MCQs and fill in the blank type questions students either give up or don't want to do the work to get the answers."*

5- Problem solving strategies and modeling.

Teacher 1: *"which has provided them with multiple examples, exercises, and various models at different difficulty levels. As a result, the students have demonstrated an improvement in their academic performance and a significant enhancement in their understanding of the subject and its underlying concepts."*

"To meet this challenge, I provided the students with exercises and strategies that would enable them to deal with ALEKS, especially to reach the required solution with the required accuracy."

"However, we have developed strategies to aid students in overcoming this obstacle and have provided them with the necessary training to utilize these strategies effectively."

Teacher 2: *"ALEKS asks the student to solve these questions in detail, in other words, focusing on and developing the students' problem-solving strategy and focusing on the details of solving the problem."*

Teacher 3: *"I have had students in the past in Grade 9 Advance who have said they preferred ALEKS to the other platform because it gives them explanations and examples to understand the content."*

6- Goal-setting and strategic planning.

Teacher 2: *"ALEKS also helps the student determine his academic goals by dividing the curriculum into lessons or parts, or in other words, developing a study plan for the student."*

"ALEKS Pie sets a goal and challenge for the student, in addition to (the most-ready-to learn) feature, which establishes a plan for the student. "

7- Iterative learning

Teacher 1: *"If I find that the student has not achieved one of the learning outcomes, I encourage the student to solve the activity again and try to solve similar questions to achieve the learning outcome."*

Teacher 2: *"ALEKS measures the extent of the student's learning and understanding of the subject. Suppose the student does not achieve the required level of learning. In that case,*

8- Gap Reduction	<i>ALEKS directs them to repeat exercises related to the subject in which they did not achieve the necessary level of understanding and mastery."</i> Teacher 1: <i>"the students' completion of the tasks assigned to them through ALEKS platform brings all students to an advanced and near-level stage, as ALEKS takes into account all levels of students."</i>
9- ALEKS Features Effective Implementation Hurdles.	Teacher 2: <i>"ALEKS narrowed the gap between students' levels, especially during the pandemic lockdown. A significant number of students have been found to have gaps in their knowledge levels. However, ALEKS has narrowed this knowledge gap. ALEKS became our primary resource in this regard."</i> Teacher 2: <i>"As for the challenges that we faced as teachers, the interruptions in the use of ALEKS due to updates to the program, which disrupts our teaching plans and leads us to search for other platforms."</i> Teacher 3: <i>"The main problem I have with implementing it effectively is that our school has insisted on ALEF being the main platform of use. So this leave us with little time to use ALEKS effectively and secondly. because the school has emphasized the importance of the other platform the majority of students are reluctant to work on ALEKS"</i> Teacher 5: <i>"in spite of the highly expected outcomes of employing all the mentioned features, the utilization would still be hard considering teachers' limited time."</i>
10- Ongoing Formative Assessment	Teacher 1: <i>"Since the class session includes activities, I often use the ALEKS platform for the closing activity"</i> Teacher 2: <i>"We started using it for evaluations and tests."</i> <i>"Until now, we have been using ALEKS in the formative assessment"</i>

Chapter 5: Discussion of The Results

ALP integration has become ubiquitous in the ever-expanding field of education technology. Despite their undeniable positive impact on students' learning outcomes, the lack of direct teacher-student interaction in the ALPs context has triggered the concern to ensure that students acquire the necessary self-regulation and autonomy to navigate and thrive in this isolated educational environment. When optimized by design and utilized by teachers' professional practices, ALPs, such as ALEKS, should orient students to evolve their study skills, including SRL processes. This study endeavors to address three questions: How do teachers perceive ALEKS's features' capacity in promoting students' SRL and autonomy? To what extent are teachers integrating ALEKS's features to promote students' SRL? The third question explores how ALEKS's features could enhance students' SRL. The findings of the mixed method study employed to fulfill this inquiry are discussed in this chapter.

5.1 Discussion of Research Question 1

The designated section of the questionnaire, which delves into examining ALEKS's effectiveness in cultivating students' SRL processes and skills as seen by teachers, revealed general affirmation of the efficacy of ALEKS's tools in promoting students' SRL among teachers. Q1, for example, looked at 13 factors that are believed to be crucial for learners to develop self-regulation; the statistical data demonstrate a significant percentage of responses endorsing ALEKS's features' effectiveness. It is notable that the mean scores are above three, which indicates an overall positive evaluation by teachers. The consistency of a median of 4 for all items' responses implies that, on average, teachers perceive ALEKS's features as effective in promoting the examined features. The moderate standard deviation, ranging from

1.18 to 1.26, suggests a considerable level of agreement among teachers' viewpoints. Refer to **Error! Reference source not found..**

Additionally, Q2 and Q3 which sought to assess teachers' agreement about ALEKS's overall effectiveness and impact on students' SRL, reflect teachers' positive outlook of ALEKS's features' capability to cultivate students' self-regulation skills and outcomes as 70.7% either agreed or strongly agreed that ALEKS's features collectively possess the capacity to promote students' SRL, and 87.8% of the participants believed that ALEKS's features have a moderate to a very high impact on students' SRL outcomes. Moreover, Q7, which sought to examine teachers' perceptions of ALEKS's features' capacity to promote students' autonomy, revealed a positive sentiment with 75.5% of participants agreeing or strongly agreeing with this notion.

Upon a closer examination of SRL processes, skills, and impact, nearly 70% of teachers quantitatively acknowledged ALEKS's effectiveness in communicating clear learning objectives, promoting students' goal-setting skills, as well as providing progress-tracking tools. Furthermore, more than 50% of the participants underscored the efficacy of ALEKS' goal-setting tools. This aligns with the qualitative findings where Teacher 2 emphasized the significant impact of ALEKS' tools in setting goals and plans for students:

“ALEKS Pie sets a goal and challenge for the student, in addition to (the most-ready- to learn) feature, which establishes a plan for the student.”. He added as well: *“ALEKS also helps the student determines his academic goals. by dividing the curriculum into lessons or parts, or in other words, developing a study plan for the student.”*

These two statements shed light on ALEKS's capabilities in facilitating targeted learning paths, which are instrumental in fostering skills that promote students' goal setting, time allocation, and strategic planning (Harati, Sujo-Montes, Tu, Armfield, & Yen, 2021). The detailed analytics that are provided by ALEKS Pie, in addition to the clear presentation of what has been achieved so far and what is pending facilitated by ALEKS's learning path, enhance students' metacognition and self-reflection. Park's (2022) study complements this finding; according to Park, the visualization of learning progress and outcomes, as seen in ALEKS, empowers learners to better control their learning. From a social cognitive standpoint, goals should be clearly defined as paramount to an individual's capacity to regulate task discharge (Anastasia Kitsantas, Nada Dabbagh, 2010).

Additionally, about 78% of teachers agree or strongly agree that ALEKS's features provide scaffolding in students' learning process, 63.4% acknowledged ALEKS's provision of guidance effectiveness, and about 58% of the participants reported that ALEKS's features facilitate the gradual release of responsibility. These findings are corroborated by the qualitative insights, particularly the emerged themes (problem-solving modelling) and (iterative learning), which are acknowledged by teachers' testimonies. Teacher 1 emphasized that ALEKS provides students with multiple examples with diverse levels of difficulty, which deepens students' understanding and emulates problem-solving approaches:

“ALEKS has provided them, the students, with multiple examples, exercises, and various models at different difficulty levels. As a result, the students have demonstrated an improvement in their academic performance and a significant enhancement in their understanding of the subject and its underlying concepts.”.

Teacher 2 has bolstered this claim by underscoring ALEKS's crucial role in training students on free-response questions and enhancing their task strategies by identifying the skills that the students lack and teaching them how to develop those skills:

“ALEKS asks the student to solve these questions in detail, in other words, focusing on developing the students' problem-solving strategy and focusing on the details of solving the problem.”.

Teacher 3 note that students prefer ALEKS as it enriches students' understanding by providing explanations and examples, has supported this claim as well:

“I have had students in the past in Grade 9 Advance who have said they preferred ALEKS to the other platform because it gives them explanations and examples to understand the content.”.

As per Zimmerman's SRL multi-level model, ALEKS problem-solving modelling feature has the capacity to refine learners' performance and assist them in developing standards for the ideal approach that would lead to optimal results (Monique Boekaerts, 2005).

In terms of iterative learning, Teacher 2 stated:

“Suppose the student does not achieve the required level of learning. In that case, ALEKS directs them to repeat exercises related to the subject in which they did not achieve the necessary level of understanding and mastery.”

Both features (problem-solving modelling) and (iterative learning) play a crucial role in providing scaffolding support for learners and thereby facilitating the gradual release of responsibility, which are cornerstones in nurturing students' SRL and developing students'

task execution strategies and, therefore, promoting students' autonomy (Anastasia Kitsantas, Nada Dabbagh, 2010). This resonates profoundly with the presented findings in Devolder, van Braak & Tondeur's (2012) systematic review which claimed that scaffolds such as worked examples and strategy prompts scaffolds, as seen in ALEKS, contribute to students' concentration, persistence, and the cultivation of effective task strategies.

The findings also reflected favorable insights into ALEKS's influential capacity in promoting students' self-monitoring and self-evaluation. For instance, more than 70% of the participants have attested ALEKS's effectiveness in providing timely feedback. According to Dabbagh (2010), this feature contributes to learners' sense of accomplishment, allowing them to evaluate their performance against their goals, as well as adjust their learning methods accordingly, therefore promoting students' self-monitoring (Anastasia Kitsantas, Nada Dabbagh, 2010). Additionally, approximately 70% reported that ALEKS's features are effective to very effective in promoting students' self-assessment. Qualitatively, as elucidated before and highlighted by the interviewees, ALEKS Pie coupled with ALEKS Timeline assist students in visualizing their progress allowing students to self-evaluate their performance and boosts students' motivations, persistence, and efforts (Park et al., 2022). Xu's review also suggested that visualized presentation elevates students' motivation and enhances their time management (Xu et al., 2023). Moreover, ALEKS's continuous dynamic assessment role was intensified by the participants, highlighting ALEKS impact in promoting self-monitoring. Furthermore, ALEKS reports feature received substantial endorsement among the participants in identifying students' learning status and level of mastery; Techer 1:

“Student progress reports are necessary for the teacher to follow up on so that he can know the student’s progress.”. Teacher 4 insight underlined ALEKS’s reports role as well: *“It is equally important to highlight the pivotal role of the educator in using the reporting functionalities in ALEKS to enhance and deepen students' learning.”*.

It is worth mentioning that ALPs, as ALEKS, mechanism inherently encourages self-monitoring, self-evaluation and self-reflection (Hashim et al., 2022). These processes which are facilitated by ALEKS’s tools promote students’ SRL by providing understanding of one's own learning process (Hashim et al., 2022). According to Zimmerman, intensive self-assessment, as manifested in ALEKS, assists learners in deciding the best task strategy to complete their tasks, identifying their knowledge gaps and how to refine their approaches accordingly, and, subsequently, boosting students’ motivation and self-efficacy (Zimmerman, 2015; Zimmerman & Zimmerman, 2010). In a contradicting finding, Harati’s (2021) study claims that ALEKS’s punitive grading system prevents students from accurately evaluating their level of understanding which might hinder students of setting realistic goals or reflecting on their problem-solving strategies.

Moreover, around 53.7% affirmed ALEKS’s recognition of achievements; this attribute positively impacts student’s motivation. The qualitative insights complemented this finding by highlighting the influential role of ALEKS gamification elements in promoting students’ motivation. Teacher 1 emphasized ALEKS badges' impact:

“The feature of badges and rewards linked to the student’s progress motivated the student to continue performing ALEKS exercises and complete all the required tasks.”.

Teacher 2 also underlined ALEKS Pie's positive effect on students’ motivation:

“As for ALEKS Pie, it positively impacted the students, as I found that they liked this challenge, and it has achieved continuous progress in the student’s level and attainment in the long term.”.

This aligns with Li’s (2022) study, which revealed that the integration of gamified elements into an e-learning context can elevate students’ SRL (Li et al., 2022). Self-efficacy belief is the essence of an individual’s motivation; as per Bandura’s SCLT, successful experiences coupled with social persuasion are two critical factors in establishing higher self-efficacy (Krapp, 2015). As illustrated in the theoretical framework of this study, the primary catalyst for SRL is an individual's belief in their ability to accomplish their objectives and prevent unfavorable outcomes, consequently building individuals’ self-efficacy, which reflects on their cognitive processes such as goal-setting and planning (Bnadura, 1978).

Despite the substantial endorsement of ALEKS’s capacity to foster students’ SRL and autonomy, there was a widespread agreement among participants regarding the need for enhancing ALEKS’s features to better support students’ SRL growth with 78.1 % agree or strongly agree that enhancement is needed. The insights obtained through the interviews and the open-ended section of the questionnaire justified this need for enhancement. The qualitative data revealed that certain aspects of ALEKS might provoke frustration, affecting students’ self-efficacy, leading to a decrease in students’ motivation, and subsequently impacting students’ cognitive processes. There was a general agreement that ALEKS rigid grading system presented a challenge for students, as ALEKS penalizes inaccurate final answers. As per interviewees’ statements, ALEKS assigns zero score for incorrect final answers which seen unfair evaluation of students’ understanding. As per Teacher’s 1 note:

“Students faced a problem in ALEKS for Chemistry, especially in asking the student to write the final result using (significant figure). This caused concern for the student from ALEKS, as the student's complete answer was considered incorrect due to tenths of a percentage.”. Teacher 2 as well has emphasized that concern:

“ALEKS platform sometimes requires a specific and accurate answer for each question, meaning there is no flexibility in solving mathematical problems. If the student does not provide the correct final result, the entire question mark will be deducted.”

Teacher 3 has underlined another source of students’ frustration that is ALEKS requires serious work to get the answer:

“ALEKS is not just MCQs and fill in the blank type questions students either give up or don't want to do the work to get the answers.”.

These claims complement Harati’s (2021) findings which suggest that ALEKS’s hard penalties system in addition to the lengthy problem solving steps which can be time consuming are two of the main influential factors in the drop in students’ SRL (Harati, Sujo-Montes, Tu, Armfield, Yen, et al., 2021). Ahmad & Rafhi (2020) findings as well has emphasized these downsides in ALEKS (Ahmad & Rafhi, 2020).

The qualitative findings have highlighted few obstacles that prevent harnessing ALEKS’s integrated tools in honing students’ capabilities. The participants agreed that the implementation of multiple platforms which is required by ESE represents a burden on both students and teachers which hinder beaming their effort towards cultivating students’ skills. As per Teacher 3:

“The main problem I have with implementing it, ALEKS, effectively is that our school has insisted on ALEF being the main platform of use. So, this leave us with little time to use ALEKS effectively and secondly, because the school has emphasized the importance of the other platform the majority of students are reluctant to work on ALEKS”.

Teacher 5 underlined this challenge as well. This note resonates with Alvi & Gillies (2020) findings, which indicated that the school’s policy and teachers’ limited time are two factors that hinder teachers’ effective SRL promotion.

Additionally, the disconnection of ALEKS caused by the ongoing system upgrading represents a challenge for teachers as they need to adjust their planning accordingly to accommodate ALEKS’s absence, as per Teacher’s 2 statement:

“As for the challenges that we faced as teachers, the interruptions in the use of ALEKS due to updates to the program, which disrupts our teaching plans and leads us to search for other platforms”.

5.2 Discussion of Research Question 2

The second research question aims to examine the extent to which teachers are employing ALEKS’s features to promote students’ SRL. To fulfil this goal, the questionnaire examined if certain practices that might lead students towards acquiring self-regulatory and independency are being utilized by teachers within ALEKS framework. The analysis revealed varying levels of implementation across different practices. The responses were classified as high frequent implementation if participants reported "always" or "often," while "sometimes" considered moderate frequent implementation, and responses of "rarely" or "never" indicated infrequent implementation.

Notably, a significant majority of the participants reported high frequency of forethought phase related practices. Noteworthy examples include 73.2 % reported high frequency of communicating learning objectives, 65.4 % as well communicate assignment expectation very frequently, and 68.3% showed high frequency of communicating deadlines, and an equal percentage assist students in setting their goals. While these numbers might reflect a high engagement, in the broader sense, these practices need higher consistency implementation.

Moving on to the performance phase practices, the phase in which self-control and self-monitoring come into action and students are engaged in task execution, nine practices were investigated. Generally, teachers' engagement appears to be moderately frequent. While employing SRL explicit practices, such as providing rubrics that would assist students in assessing their SRL processes, might be deemed as going the extra mile considering teachers' other commitments, it was noticed that critical practices such as providing guidance and feedback based on ALEKS progress tools needed more attention. For instance, P5 and P6 which examine the frequency with which teachers are encouraging their students to review their progress using ALEKS progress-tracking tools and adjust their learning techniques accordingly, less than 60% reported high-frequency implementation ("always" and "often"). Nevertheless, the participants reported highly frequent implementation, nearly 70%, of adherence to four essential practices that contribute to progress monitoring and self-efficacy elevation. Firstly, P4: familiarizing students with progress tracking tool, aligning with Rafahi's (2020) study which underscored teachers' role in acquainting students with ALEKS's tools to achieve the purpose of employing ALS. Secondly, P14: encouraging revisiting mastered topics, which is a fundamental practice that has been proven to improve student's performance

as suggested by Bishara & Jacoby (2008), leading to boosting students' self-efficacy (Krapp, 2015). Thirdly, P17: encouraging mastery monitoring which is essential for fostering affective self-assessment as suggested by many studies (Anastasia Kitsantas, Nada Dabbagh, 2010). Fourthly, P19: encouraging collaboration and peer feedback which spark social comparison, enhance students' competition management skills, promote students' comprehension reflection, as well as provide help as highlighted by Pino (2018) citing Hattie (2009).

In addressing the self-reflection phase, where learners evaluate their performance and react based on their evaluation, while effective practices are in place, more consistent engagement could be attained. Practices P8 and P9 for example, which examine teachers' direct interaction with student to discuss their progress in ALEKS and guide them in reflecting on their goals and strategies, showed that approximately 48% reported high frequent implementation and 41.5% reported moderate frequent implementation. Additionally, Practices P10, P11, and P12 which involve reviewing ALEKS progress reports with the students, providing feedback, and encouraging students to reflect on the received feedback, these practices reflected moderate to high frequent implementation. Practice P21, which focuses on acknowledging students' progress, indicated higher trend of implementation with 24.4% reporting "sometimes", 26.8% reporting "often", and reporting 41.5 % "always".

The qualitative results revealed that teachers are effectively leveraging ALEKS's features in cultivating students' SRL. For instance, Teacher 2 assigned part of the course total grade on the completion of ALEKS's Pie, as per Teacher 2:

"I tried to base part of my students' math grade on ALEKS Pie completion. Some students actually achieved 100% of ALEKS Pie. After this achievement, I noticed that these

students in subsequent years, as I continued to teach them four years in a row, I found a big leap in the level of students who achieved 100% before and after they completed ALEKS Pie, which affected their final grades.”

As mentioned earlier, Park’s study suggested that such tool has the capacity to establish a clear goal for the students, orient students towards progress-monitoring, as well as booster students’ motivation. Furthermore, Anastasia Kitsantas & Nada Dabbagh (2010) citing Code (2006) posit that utilizing Edtech tools for goal-setting enhances students’ sense of control. Sharing ALEKS reports with students and parents was another proactive practice employed by Teacher 2 that contributes to self-regulatory promotion:

“In addition to extracting ALEKS reports, translating them into simpler reports that the student and guardian can comprehend, and sharing them weekly to monitor the student's growth.”

Employing ALEKS as a lesson closing activity is another utilization of ALEKS employed by Teacher 1 that promotes students’ SRL as it encourages the students to assess their progress and reflect on their comprehension leading to goal adjustment, strategy refinement and motivation enhancement (Zimmerman, 2008). Using badges and rewards system facilitated by ALEKS is a practice employed by both interviewees that promotes SRL with its positive reinforcement effect, as per Bandura’s SCLT social reinforcement can have a great impact on students’ self-regulation behaviour (Bandura, 1978). Teacher 1 as well has provided training for students to overcome ALEKS’s grading system challenge:

“To meet this challenge, I provided the students with exercises and strategies that would enable them to deal with ALEKS, especially to reach the required solution with the required accuracy.”

This practice would enhance students’ task discharge strategy, cultivates students’ self-efficacy beliefs as per Bandura’s SCLT, as well as mitigates the previously mentioned drawbacks associated with ALEKS’s rigid grading system.

The findings demonstrated that teachers are actively utilizing ALEKS’s features and tools in ways that promote students’ SRL. It is worth mentioning that participants demographics did not have any discernible impact on teachers’ engagement. Quantitatively teachers’ responses exhibited a laudable effort of implementation that cater the three SRL phases. However, there is a room for more consistency. The qualitative insights showcased teachers’ proactive practices that harnessed ALEKS’s features to cultivate students’ SRL, autonomy, and foster their self-efficacy beliefs.

5.3 Discussion of Research Question 3

To what extent do the features of ALP, specifically ALEKS, support and enhance students' SRL?

The preceding sections indicated that ALEKS’s features and tools have the capacity to foster students’ SRL. The findings demonstrated that ALEKS possesses attributes that can facilitate the six key SRL processes outlined by Zimmerman: goal setting, task strategy, self-monitoring, self-evaluation, time management, and help-seeking. ALEKS visual progress tracking tools, ALEKS Pie and Timeline, were found to contribute to students’ goal-setting and time management skills, as well as students’ self-monitoring (Park et al., 2022; Xu et al.,

2023). The findings also suggest that ALEKS worked examples combined with ALEKS's continuous assessment and the iterative learning approach inherited in ALEKS establish a feedback loop that enhances students' task strategies, facilitate the gradual release of responsibility, and nurture students' autonomy (Zimmerman, 2015; Zimmerman & Zimmerman, 2010). As highlighted in the previous sections, ALEKS learning analytics and reports enable students to assess their learning status and level of mastery which facilitate students' self-monitoring, promote students' self-evaluation, and contribute to students' sense of accomplishment (Anastasia Kitsantas, Nada Dabbagh, 2010).

To elucidate how ALEKS has the capacity to promote students' SRL and conduct, this study utilized SCLT. SCLT highlights how behavioral, cognitive, and environmental factors interact intricately to develop individual's skills, beliefs, and overall cognitive processes (Nabavi, 2012). SCLT overarches four main principles that can clarify the mechanism that directs individuals to acquire knowledge and self-regulate their learning: observational learning, self-efficacy, modeling, and reinforcement (Bandura, 1997). While observational learning and modeling are manifested in ALEKS's intensive worked examples and dynamic assessment, the findings indicate that ALEKS mechanisms can cultivate robust self-efficacy beliefs which are crucial in developing effective self-regulation (Bandura, 1997), especially when employed within a conducive learning environment that is facilitated by teachers. Self-efficacy beliefs are formed through reflecting on past successes and failures, observing others, receiving positive feedback, and developing emotional resilience (Krapp, 2015). Within ALEKS context, the participants endorsed the role of ALEKS's visual progress tracking tools, ALEKS's timely feedback mechanism, and ALEKS learning analytics in giving students a

sense of accomplishment which assists in forming learners' self-efficacy. Moreover, recognition of achievement is an essential factor that forms self-efficacy; while about 53.7% acknowledged ALEKS's recognition of achievements' effectiveness in promoting students' SRL, the teachers' practices questionnaire demonstrated teachers' high frequent praise of students' growth based on their ALEKS progress. Furthermore, the interviewees underscored ALEKS's rewarding system's role in motivating students through its positive reinforcement impact and cultivating a positive self-efficacy. Additionally, teachers' verbal insights shed light on ALEKS's attributes that could effectively form positive self-efficacy beliefs; for example, Teacher 2 and Teacher 3 stated that ALEKS exercises presented a positive challenge for some students; such challenge, when met successfully, boosts students' self-efficacy. In addition, Teacher 1 and Teacher 2 saw that ALEKS had narrowed the knowledge gap among the students and brought them to a near level of comprehension, which would reflect on students' confidence and contribute to the growth of their self-efficacy beliefs. Moreover, teachers' proactive practices within ALEKS framework such as dedicating part of the course total mark for the completion of ALEKS pie elevated students' understanding level, consequently, promoting their self-efficacy. Training students to overcome ALEKS's challenging grading system is another proactive practice that integrate observational learning and modeling as well as contribute to forming positive students' self-efficacy by promoting students' confidence in their capability to overcome challenges. SCLT stated that the essential driving force behind self-regulation is an individual's confidence in their competence to achieve their goals and avoid negative consequences (Bandura, 1997).

Chapter 6: : Conclusion

AL is a cutting-edge technology that marks a milestone in education with its immense potential to optimize students' performance and attainment through tailored learning experiences. However, the secluded nature of this learning environment has not only necessitated ensuring that students are equipped with the essential skills to benefit and prosper within this landscape but also underscored the importance of aligning teachers' practices to meet this demand. SRL is a critical skill that is extremely needed in this academic setting. A focus on how these platforms' tools, features, and mechanisms could impact students' SRL is of utmost. This study examined the ALP, ALEKS, capability to foster students' SRL. The study investigated several facets, including teachers' perspectives of ALEKS's features to promote students' SRL and autonomy, teachers' practices within ALEKS context that might enhance students' SRL, as well as assessed the extent to which ALEKS can cultivate students' SRL.

6.1 Main Findings

The findings of this paper unveiled general acknowledgment among the participants regarding the effectiveness of ALEKS's tools and mechanisms in promoting students' SRL and its positive impact on students' SRL outcomes and autonomy. The study also addressed their concerns and shed light on the stumbling blocks that might hinder their ability to fully utilize ALEKS's features for promoting students' academic competencies. The quantitative responses, which aligned with the qualitative findings, indicate a positive affirmation of ALEKS's efficacy in cultivating the six SRL processes suggested by Zimmerman. The

qualitative insights gleaned from teachers' interviews further offered an in-depth understanding of the impact of ALEKS's attributes on SRL processes. The study suggests that utilizing ALEKS' progress-tracking tools, such as ALEKS's Pie and the student's timeline, can enhance students' metacognition skills, and elevate their goal-setting, strategic planning, self-monitoring, and time-management abilities. Moreover, ALEKS's intensive assessment mechanism coupled with ALEKS's worked examples and the iterative learning approach that ALEKS utilizes, in addition to ALEKS provision of guidance, all synergistically enhance students' task strategies and facilitate self-evaluation and the acquisition of autonomy. It is imperative to underscore teachers' endorsement of the impact of the mentioned features, along with ALEKS's gamification elements and its reward system, on students' motivation and self-efficacy promotion. The findings also illuminated the downsides of ALEKS's system. The participants emphasized ALEKS's rigid and punitive grading system's negative impact on students' self-evaluation and self-reflection, as well as on students' motivation and self-efficacy. Teachers' insights also brought attention to the time-consuming nature of ALEKS's mastery system and the potential frustration it might bring as a single mistake can set the student back and result in a deduction of earned points.

The findings demonstrate the presence of teachers' employment of strategies that are believed to foster students' SRL abilities and steer them toward embracing SRL practices within ALEKS framework. The analysis indicates that teachers are effectively utilizing ALEKS's features to guide students through the three phases of SRL: forethought, performance, and self-reflection. As the questionnaire targeted examining the frequency with which these strategies are being employed by teachers, teachers' level of implementation

varied across these strategies. While effective practices are indeed in place, a clear call for more consistent engagement is needed. The qualitative insights further shed light on teachers' innovative practices in harnessing ALEKS's features. Dedicating part of the course total grade on ALEKS Pie completion, training students to overcome ALEKS's challenging grading system, in addition to sharing ALEKS's progress reports with students and their guardians on a weekly basis, to name a few, are clear indications that ALEKS's tools are being well-implemented, aiming to cultivate students' SRL, autonomy, and foster students' self-efficacy beliefs.

The study findings, combined with the theoretical framework, uncovered ALEKS's potential to promote students' SRL. ALEKS mechanism facilitates the formulation of the SRL empowerment cycle. ALEKS's most-ready-to-learn feature, as suggested by teachers' insights, assists students in planning and setting their goals. Students' engagement with ALEKS's intensive learning exercises and assessments with its timely feedback, aided by ALEKS's visual progress tools, all allow students to monitor and make informed decisions about their learning approaches and adjust their strategies to meet their goals, creating an ongoing feedback loop that regulates students' learning meeting Zimmerman's SRL cyclic model. Furthermore, the findings suggest that ALEKS's features could impact students' motivation and self-efficacy. ALEKS's gamification attributes, such as the visual tracking tools and badges, are believed to bolster students' sense of accomplishment, leading to promoting their self-efficacy beliefs, which are essential according to Bandura's SCLT to derive self-regulation. Nevertheless, the findings highlight potential drawbacks associated with ALEKS's strict grading system, which might affect students' ability to self-evaluate their progress,

negatively impacting their self-efficacy. Additionally, ALEKS's time-consuming learning activities can be seen as a limitation that might provoke boredom and pose challenges for students to keep up with their goals.

6.2 Study Recommendations

The insights obtained from this study shed light on valuable implications for educators, policymakers, and instructional designers and developers. The findings highlighted the obstacles that might hinder the effective utilization of ALEKS or any other ALP. Based on teachers' insights, the study recommends the following:

1. Providing teachers with professional training that assists them in understanding the potential of each tool within an employed platform and guiding them to employ each tool purposefully to align with students' academic growth demands.
2. Training teachers on strategies to overcome any challenge that might be posed by the platform itself, the policy employed, or by unforeseen circumstances.
3. Foster learning communities to share and exchange the best practices and insights within the context of ALP integration.
4. Limit the number of employed platforms so teachers can more effectively focus their efforts, reducing the burden imposed on students and teachers.
5. Instructional designers should reevaluate the platform grading system, punitive mechanism, and balance exercise time consumption to ensure a more motivating learning experience.

6.3 Study Limitations

The study encountered several limitations. Originally, the research's second and third questions were aimed to be answered by administering the questionnaire to students. However, permission to survey the students was not granted. Accordingly, the questionnaire was modified to be answered by teachers. The absence of students' perspectives might have impacted the comprehensive visualization of the extent to which teachers utilize ALEKS features to foster students' SRL (RQ2) and how these features cultivate students' SRL (RQ3). Furthermore, distributing the questionnaire posed an additional challenge. While the ESE research team has, thankfully, circulated the questionnaire to all ESE schools' principals for dissemination to targeted teachers, principals' response was minimal, which affected the sample size and, consequently, the robustness of the findings. Additionally, as ALEKS is being employed by ESE elite and advanced streams only, in addition to the fact that ALEKS primarily caters to mathematics and chemistry subjects, further limited the number of targeted participants. Moreover, limiting the number of nominated schools for interviews to only two, with permission granted by only one school principal, combined with teachers' hectic schedules and availability, has constrained the number of potential interviewees, subsequently restricting the diversity in the gleaned insights.

6.4 Future Work

Examining the impact of ALEKS and other ALPs on students' SRL and academic competencies requires a comprehensive examination of various aspects and the utilization of a wide variety of approaches. Students' perspectives are highly needed to better understand ALEKS's impact on their SRL within ALEKS's framework and on their SRL outcomes and

autonomy. Replicating the study from the students' perspectives is recommended, taking into account the diversity in their abilities and competencies. Conducting a case study or a quasi-experiment that would monitor teachers' implementation of what are believed to be effective SRL promotion practices and examining the outcome of this implementation on students' SRL skills can assist in gaining a deeper insight of these platforms' potential.

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Appendices

Appendix A: Teachers' Survey

Teachers' Survey

Dear Teachers,

You are kindly invited to partake in this study, which seeks to explore the utilization of ALEKS platform features by teachers to enhance students' self-regulated learning. The primary goal of this study is to investigate the overall impact of Adaptive Learning Platforms (ALP), specifically ALEKS, in supporting SRL. Your valuable insights, obtained through the completion of the enclosed questionnaire, will provide valuable information on how ALEKS features contribute to students' capacity to regulate their own learning processes, as well as shed light on your practices in fostering SRL.

I want to assure you that your participation and responses will be treated with the utmost confidentiality. Your identity and the confidentiality of your data will be strictly maintained throughout the research process. The findings will be reported in an aggregated and anonymous manner to ensure the highest level of privacy and confidentiality.

Your participation in this research study is highly valued, and I genuinely appreciate your time and willingness to contribute.

By completing the survey, you are consenting to participate in this study. Thank you for agreeing to participate in this study.

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المطلوبون الاجزاء

يسموني دعوتكم للمشاركة في هذه الدراسة، التي تهدف استكشاف استخدام المعلمين لميزات منصة أليكس، لتعزيز تعلم الطلبة الذاتي المنظم، وللتحقق في الدور العام لمميزات التعلم الذكية، وتحديدًا منصة أليكس، في دعم التعلم الذاتي المنظم من خلال إكمال الاستجابة المرفقة، وستوفر لنا نظرة قيمة حول كيفية إسهام ميزات أليكس في قدرة الطلبة على تنظيم عملية تعلمهم الخاصة وممارستها في تعزيز التعلم الذاتي المنظم.

وأرد أن أؤكد لكم أن مشاركتكم وردودكم ستعامل بالخصوص قدر من السرية. وسنم الحفاظ على هويتكم وسرية بياناتكم بدقة طوال عملية البحث.

نهمنا مشاركتكم في هذه الدراسة البحثية، وإذا أقرر خطأ وقتك واستجابتك للإسهام من خلال إكمال الاستطلاع، فتأكد توافقك على المشاركة في هذه الدراسة. شكرًا لك على موافقتك على المشاركة في هذه الدراسة

تسليم المصري

ماجستير تكنولوجيا التواصل و المعلومات
الجامعة البريطانية في دبي

20002417@student.buid.ac.ae [Switch account](#)

Not shared

* Indicates required question

هل توافق على المشاركة في هذه الدراسة? *

Do you agree to participate in this study?

☐ Yes / نعم

☐ No / لا

Next

Clear form

Teachers' Survey

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Not shared

* Indicates required question

Demographic Information / معلومات ديموغرافية

Gender / الجنس *

☐ Female / أنثى

☐ Male / ذكر

Please select the option that best describes the type of school \ institution where you work *

الرجاء اختيار الخيار الأنسب الذي يصف نوع المدرسة التي تعمل فيها

☐ Girls' school / مدرسة للبنات

☐ Boys' school / مدرسة للذكور

☐ Co-educational school (both girls and boys) / مدرسة مختلطة (للبنات والذكور)

What is your primary teaching setting? *

المرحلة التدريسية

☐ Cycle 2 (Grade 5 to Grade 8) / حلقة ثانية

☐ Cycle 3 (Grade 9 to Grade 12) / حلقة ثالثة

☐ Higher Education / التعليم العالي

Years of Teaching Experience: *

عدد سنوات الخبرة في مجال التدريس

☐ Less than 1 year / أقل من سنة

☐ 1-5 years / سنوات

☐ 6-10 years / سنوات

☐ 11-15 years / سنوات

☐ 16 years or more / سنة أو أكثر

Please indicate the subject you teach *

يرجى تحديد المادة التي تدرسها

☐ Mathematics / الرياضيات

☐ Chemistry / الكيمياء

Please select the option that corresponds to your highest level of education *

تحديد الخيار الذي يتوافق مع مستواك التعليمي

☐ Bachelor's degree / درجة البكالوريوس

☐ Master's degree / درجة الماجستير

☐ Doctorate degree / درجة الدكتوراه

☐ Other: _____

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* Indicates required question

تصور المعلمين "Teachers' Perception of ALEKS Features and Self-Regulated Learning"
لميزات أليكس وإسهامها في تعزيز العمليات التعلم الذاتي المنظم

Question 1

Kindly rate the effectiveness of ALEKS features in fostering the following students' self-regulated learning processes/skills:

Please use the scale below to indicate your response:

يُقيم فاعلية ميزات منصة ALEKS في تعزيز عمليات ومهارات التعلم المنظم

ذاتيًا للطلاب

يرجى استخدام المقاييس أدناه للإجابة إلى إجابتيك

	Very Ineffective غير فعالة جدًا	Ineffective غير فعالة	Neutral محايدة	Effective فعالة	Very Effective فعالة جدًا
Goal-setting تحديد الأهداف	☐	☐	☐	☐	☐
Progress tracking متابعة تقدم الطالب	☐	☐	☐	☐	☐
Timely feedback التغذية في الوقت المناسب	☐	☐	☐	☐	☐
Self-assessment التقييم الذاتي	☐	☐	☐	☐	☐
Gradual release of responsibility تدريج انتقال المسؤولية	☐	☐	☐	☐	☐
Providing clear learning objectives تحديد أهداف تعليمية واضحة	☐	☐	☐	☐	☐
Goal-setting tools توفير أدوات لتحديد الأهداف	☐	☐	☐	☐	☐
Reflection on previous achievements and progress التفكير في الإنجازات السابقة والتقدم المحرز	☐	☐	☐	☐	☐
Regular monitoring of progress الرصد المنتظم للتقدم	☐	☐	☐	☐	☐
Recognition and acknowledgement of achievements الاعتراف والتقدير للإنجازات	☐	☐	☐	☐	☐
Provision of guidance توفير الإرشادات والمصادر للتحسين	☐	☐	☐	☐	☐
Encouragement of self-reflection تعزيز التفكير الذاتي	☐	☐	☐	☐	☐
Importance of progress monitoring مراقبة وتقديم التقدم	☐	☐	☐	☐	☐





Question 2 *

Strongly Disagree لا أوافق تمامًا Disagree لا أوافق Neutral محايد Agree أوافق Strongly Agree أوافق تمامًا

Please rate the extent to which you believe ALEKS features effectively promote students' self-regulated learning
يرجى تقييم مدى اعتقادك أن ميزات المنصة تعزز بشكل فعال تعلم الطلاب المنظم ذاتيًا.

☐ ☐ ☐ ☐ ☐

Question 3 *

No impact لا تأثير Low Impact تأثير محدود Moderate Impact تأثير متوسط High Impact تأثير كبير Very High Impact تأثير كبير جدًا

How do you assess the impact of ALEKS features on students' self-regulated learning outcomes?
كيف تقيم تأثير ميزات المنصة على نتائج التعلم ذاتية التنظيم للطلاب؟

☐ ☐ ☐ ☐ ☐

Question 4

Never أبدًا Rarely نادرًا Sometimes أحيانًا Often غالبًا Always دائمًا

Do you motivate your students to take advantage of ALEKS features for their own self-regulated learning? Please rate your level of implementation.
هل تحفز طلابك على الاستفادة من ميزات المنصة لتعلمهم المنظم ذاتيًا؟ يرجى تقييم مستوى تنفيذك

☐ ☐ ☐ ☐ ☐

Question 5

Never ألياً
Rarely نادراً
Sometimes أحياناً
Often غالباً
Always دائماً

Rate your frequency of utilizing strategies to motivate students to use ALEKS features for self-regulated learning.

قيم تكرار استخدامك لاستراتيجيات لتحفيز الطلاب على استخدام ميزات المنصة للتعلم المنظم ذاتياً

☐ ☐ ☐ ☐ ☐

Question 6 *

Strongly Disagree لا أوافق تماماً
Disagree لا أوافق تماماً
Neutral محايد
Agree أوافق
Strongly Agree أوافق تماماً

ALEKS features provide scaffolding support to students' learning process?

هل ميزات المنصة توفر الدعم اللازم لعملية تعلم الطلاب؟

☐ ☐ ☐ ☐ ☐

Question 7 *

Strongly Disagree لا أوافق تماماً
Disagree لا أوافق تماماً
Neutral محايد
Agree أوافق
Strongly Agree أوافق تماماً

Utilizing the various features of ALEKS can enhance students' autonomy.

استخدام الميزات المختلفة للمنصة يمكن تعزيز استقلالية الطلاب

☐ ☐ ☐ ☐ ☐

Question 8 *

Strongly Disagree لا أوافق تماماً
Disagree لا أوافق تماماً
Neutral محايد
Agree أوافق
Strongly Agree أوافق تماماً

Rate the extent to which you believe ALEKS features can be further enhanced or modified to better support students' self-regulated learning.

قيم مدى اعتقادك بأنه يمكن تعزيز أو تعديل ميزات المنصة لدعم تعلم الطلاب المنظم ذاتياً بشكل أفضل

☐ ☐ ☐ ☐ ☐

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* Indicates required question

Teacher Practices and Implementation of ALEKS: Assessing Frequency and Strategies

Instructions: Please rate the statements below based on the frequency of your implementation of ALEKS practices as a teacher. Use the scale below to indicate your response: *

1 - Never 2 - Rarely 3 - Sometimes 4 - Often 5 - Always

نرجو منك تقييم العبارات أدناه وفقاً لتكرار تطبيقك لممارسات أليكس كـ معلم. يُرجى استخدام المقاييس أدناه للإجابة على ردتك:

أبداً 1 - نادراً 2 - أحياناً 3 - غالباً 4 - دائماً 5

	Never / أبداً	Rarely / نادراً	Sometimes / أحياناً	Often / غالباً	Always / دائماً
I clearly communicate the learning objectives and outcomes of each lesson or unit. أنقل بوضوح - أهداف ونتائج التعلم لكل درس أو وحدة	☐	☐	☐	☐	☐
I guide my students in setting specific goals and encourage them to reflect on their progress within ALEKS toward those goals. أقدم الدعم لمطلبي في وضع أهداف محددة واتجهمهم على التفكير في تقدمهم على المنصة نحو تحقيق تلك الأهداف	☐	☐	☐	☐	☐
I provide checklists/ rubrics to help students self-assess their performance in areas such as goal-setting, planning, monitoring, and reflection. أوفر قوائم معايير/ تقييم لمساعدة الطلاب في تقييم أدائهم في مجالات مثل تحديد الأهداف والتخطيط والمراقبة والتفكير	☐	☐	☐	☐	☐
I familiarize my students with the progress tracking tools available in ALEKS. أعرّف مطلبي بأدوات تتبع التقدم المقدمة في المنصة	☐	☐	☐	☐	☐
I emphasize the importance of regularly reviewing the progress-tracking tools in ALEKS to keep students motivated. أؤكد على أهمية المراجعة المنتظمة لأدوات تتبع التقدم في المنصة للحفاظ على تحفيز الطلاب	☐	☐	☐	☐	☐

I help students understand how to make necessary adjustments to their learning approach based on the information provided by the progress tracking tools in ALEKS. أساعد الطلاب في فهم كيفية إجراء التعديلات اللازمة على أسلوبهم التعلمى استناداً إلى المعلومات المقدمة من أدوات تتبع التقدم فى المنصة.	☐	☐	☐	☐	☐
I provide targeted feedback and guidance based on students' progress in ALEKS. أقدم ملاحظات وتوجيهات مستهدفة استناداً إلى تقدم الطلاب فى المنصة.	☐	☐	☐	☐	☐
I schedule individual or group check-in sessions to discuss students' progress in ALEKS. أحدد جلسات فردية أو جماعية لمناقشة تقدم الطلاب فى المنصة ومناقشته.	☐	☐	☐	☐	☐
During check-in sessions, I review students' goals in ALEKS. خلال جلسات المتابعة، أستعرض أهداف الطلاب فى المنصة.	☐	☐	☐	☐	☐
During check-in sessions, I review students' progress reports in ALEKS. خلال جلسات المتابعة، أستعرض تقارير تقدم الطلاب فى المنصة.	☐	☐	☐	☐	☐
I encourage students to reflect on the feedback received and consider how it can enhance their understanding and progress. أشجع الطلاب على التفكير فى الملاحظات التى تلغونها والنظر فى كيفية تعزيز فهمهم وتقديمهم.	☐	☐	☐	☐	☐

The feedback I provide helps students understand their strengths and areas for improvement in relation to the learning process and strategies used.

الملاحظات التي أقدمها تساعد الطلاب على فهم نقاط قوتهم ومجالات التحسين المتعلقة بعملية التعلم والاستراتيجيات المستخدمة.

☐ ☐ ☐ ☐ ☐

I provide guiding questions to facilitate students' reflection in ALEKS, such as "What progress have you made? What obstacles did you encounter? How can you adapt your goals to address these challenges?"

أقدم أسئلة توجيهية لتيسير عملية تفكير الطلاب في المنصة، مثل "ما هي التقدمات التي حققتها؟ ما هي العقبات التي واجهتها؟ كيف يمكنك تكيف أهدافك لمواجهة هذه التحديات؟"

☐ ☐ ☐ ☐ ☐

I emphasize the value of revisiting mastered topics in ALEKS.

أؤكد على قيمة إعادة النظر في المواضيع المتقنة في المنصة.

☐ ☐ ☐ ☐ ☐

I clearly communicate expectations for assignments, projects, and tasks.

أوضح توقعاتي بوضوح بشأن المهام والمشاريع والمهام المطلوبة.

☐ ☐ ☐ ☐ ☐

I clearly communicate deadlines for assignments, projects, and tasks.

أوضح المواعيد النهائية للمهام والمشاريع والمهام المطلوبة.

☐ ☐ ☐ ☐ ☐

I emphasize the importance of monitoring students' progress and mastery levels within ALEKS.

أؤكد على أهمية مراقبة تقدم الطلاب ومستويات إتقانهم داخل المنصة.

☐ ☐ ☐ ☐ ☐

I help students identify areas where they may need to allocate additional time or adjust their study strategies based on their progress in ALEKS.

أساعد الطلاب في تحديد المجالات التي قد يحتاجون فيها إلى تخصيص وقت إضافي أو ضبط استراتيجيات دراستهم استنادًا إلى تقدمهم في المنصة.

☐ ☐ ☐ ☐ ☐

I encourage collaboration and peer feedback to enhance students' learning strategies.

أشجع التعاون وتقديم الملاحظات من الأقران لتعزيز استراتيجيات التعلم لدى الطلاب.

☐ ☐ ☐ ☐ ☐

I facilitate a positive learning environment that promotes autonomy and responsibility.

أسهل في تسهيل بيئة تعلم إيجابية تعزز الاستقلالية والمسؤولية.

☐ ☐ ☐ ☐ ☐

I recognize and celebrate students' growth and progress based on their ALEKS progress.

أقدر وأحتفل بنمو الطلاب وتقدمهم استنادًا إلى تقدمهم في المنصة.

☐ ☐ ☐ ☐ ☐

In light of the study and its focus on the topic, is there anything else you would like to add or any additional insights you would like to share?

في ضوء الدراسة ، هل هناك أي شيء آخر تود إضافته أو أي تحليلات إضافية تود مشاركتها؟

Your answer

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Appendix B: Teachers' interview questions

1. I would like to start by asking you to kindly introduce yourself and share a brief about your educational background and your role as a teacher.
2. Can you please tell me about your experience using ALEKS platform in your classroom?
3. How do you perceive ALEKS features? Do these features support students' SRL?
4. How do you integrate ALEKS platform into your lesson planning and teaching practices, specifically to support students' SRL?
5. In light of your experience, which of ALEKS features had the greatest impact in enabling students to take ownership of their learning process?
6. In your opinion, which particular features of ALEKS platform had the most significant impact in enhancing students' SRL? How do these features fit into your educational strategies and goals?
7. Can you provide examples or share specific instances where you have successfully used features in ALEKS platform to enhance students' SRL?
8. How do you evaluate students' SRL skills while using ALEKS platform?
9. What challenges, if any, did you face while using ALEKS platform? How did you deal with these challenges?
10. How do you see students' perceptions and opinions towards using the ALEKS platform features for their SRL?
11. Do you think ALEKS platform has increased the gap between students at different levels?
12. In your opinion, what are the main barriers or challenges that teachers face when using ALEKS platform features? How can these challenges be overcome?
13. Is there anything else you'd like to add or share before we conclude?

Appendix C: Transcribed Teachers' interviews

Teacher 1 Interview

1. هل يمكنك البدء من فضلك بتقديم نفسك ومشاركة بعض المعلومات عن خلفيتك في مجال التعليم ودورك كمعلم؟

اسمي عمر بني خلف من الأردن. خبرتي التعليمية 15 سنة في التدريس. بدأت التدريس في الأردن بالعام 2009

عملت في جامعة سطات حيث إنني درست الكيمياء العضوية لطلاب السنة التحضيرية لطلاب الطب والصيدلة لسنتين

ثم انتقلت للعمل في وزارة التربية والتعليم في الإمارات وهذا عامي السادس في وزارة التربية والتعليم في الإمارات

2. هل يمكنك أن تخبرني عن تجربتك في استخدام منصة أليكس في فصلك الدراسي؟

حاليا منصة أليكس هي منصة مميزة جدا بصراحة. بها العديد من الميزات التي تساعد المدرس والطالب بحيث انه يحقق نواتج التعلم. أنا بدأت باستخدام منصة أليكس تقريبا قبل أربع سنوات. من ثلاث سنوات بدأت استخدامها بشكل فعلي ودائم. تساعدني كثيرا بكتابة الاختبارات والتحضير للحصة واستخراج نواتج التعلم لكل درس بالإضافة لأنها تساعدني بعمل أوراق عمل للطلاب وتصحيحها بشكل سلس وسريع جدا

3. كيف تصف ميزات منصة أليكس الرئيسية؟ هل تدعم هذه الميزات تعزيز تعلم الطلاب الذاتي؟

منصة أليكس تمكننا من عمل واجبات وأوراق عمل ودفتر درجات وهذا الشيء بمثابة نسخة احتياطية لمستوى الطالب تمكننا من متابعة الطالب بشكل أفضل خلال العام الدراسي ومن خلالها نتمكن من تحديد نقاط القوة والضعف لدى الطالب وكيف سيتم معالجتها

4. كيف يمكنك دمج منصة ALEKS في تخطيط الدروس وممارسات التدريس لديك، وتحديدًا لدعم تعلم الطلاب ذاتي التنظيم؟

حاليا وكما تعلمين إنا مطالبون من قبل الوزارة باستخدام أكثر من منصة (ألف , أليكس, إنسباير) فتقريبا وليس بشكل كامل أقوم لا باستخدام منصة أليكس لكل حصة إلا أنني أعتمد على أليكس بنسبة 25 إلى 40 % بتحضير الدروس. وحيث أن الحصة الصفية تتضمن نشاطات فغالبا ما استخدم منصة أليكس للنشاط الختامي

تقارير متابعة الطلاب من الضروري جدا أن يقوم المعلم بمتابعتها حتى يتمكن من معرفة مدى تقدم الطالب. فلو وجدت بأن الطالب لم يحقق أحد نواتج التعلم أحث الطالب على القيام بحل النشاط مرة أخرى و أن يحاول حل أسئلة مشابهة ليحقق ناتج التعلم

5. في ضوء تجربتك، أي من هذه الميزات كان لها تأثير أكبر في تمكين الطلاب من تحمل مسؤولية عملية تعلمهم؟

أكثر خاصية أجدها فعالة في أليكس هي الواجبات حيث أن الطالب يقوم بحل هذه المهام بمفرده و نقوم نحن المعلمون من خلال تقارير أليكس بمعرفة مستوى الطالب. وطبعا خاصية التقارير أيضا تمكننا من معرفة موقع الطالب بالتحديد

6. في رأيك ، ما هي الميزات الخاصة في منصة أليكس التي كان لها تأثير أكبر في تعزيز تعلم الطلاب الذاتي؟ وكيف تتناسب هذه الميزات مع استراتيجياتكم وأهدافكم التعليمية؟

من خلال الواجبات المنزلية التي نعطيها للطلاب للقيام بحلها بشكل منفرد التي تحقق النواتج التي نطمح لها خلال الحصة الصفية

7. هل يمكنك تقديم أمثلة أو مشاركة حالات محددة حيث استخدمت الميزات في منصة أليكس بنجاح لتعزيز تعلم الطلاب الذاتي؟

هناك عدة طالبات منصة أليكس قامت بتزويدهم بالعديد من الأمثلة والتمارين ونماذج مختلفة لمستويات مختلفة مما

أدى إلى رفع مستواهم التحصيلي وانعكس بشكل ملحوظ على فهمهم للمادة

8. كيف تقوم بتقييم مهارات تعلم الطلاب الذاتي أثناء استخدام منصة أليكس؟

بداية بعض خصائص أليكس ينظر لها الطالب بمثابة تحدي لتحقيق نسبة عالية في مقياس تتبع التقدم

كما أنه خاصية الأوسمة والمكافآت المرتبطة بتقدم الطالب حفزت الطالب على متابعة أداء التمرينات على أليكس

وانهاء جميع المهام المطالب بها

9. ما هي التحديات، إذا وجدت، التي واجهتها أثناء استخدام منصة أليكس؟ وكيف تعاملت مع هذه التحديات؟

الطلاب واجهوا مشكلة في أليكس لمادة الكيمياء خصوصا وهي مطالبة الطالب كتابة الناتج النهائي باستخدام "significant figure"

مما تسبب بقلق للطلاب من أليكس حيث أنه إجابة الطالب كاملة تعتبر خطأ بسبب أخطاء منهوية. صحيح أن هذه الكسور ضرورية لحل جميع الأسئلة خصوصا لمادة الكيمياء

لمواجهة هذا التحدي قمت بتزويد الطلاب بتمارين و استراتيجيات تمكنهم من التعامل مع أليكس خصوصا للوصول إلى الحل المطلوب بالدقة المطلوبة

10. كيف ترى تصورات وآراء الطلاب تجاه استخدام ميزات منصة أليكس لتعلمهم الذاتي؟

في بعض الأحيان ينظر الطلاب إلى منصة أليكس كعبء إضافي حيث أنهم مطالبون بأنشطة ومشاريع وواجبات أخرى. إلا أنه مهارة تنظيم الوقت لدى البعض مكنتهم من الاستفادة من ميزات أليكس لدعم عملية تعلمهم الذاتي

11. هل تعتقد أنه منصة أليكس زادت الفجوة بين الطلاب بالمستوى المتقدم والمستويات الأقل

بالعكس. قيام الطالب بحل المهام المكلف بها من خلال منصة أليكس توصل جميع الطلاب إلى مرحلة متقدمة و قريبة المستوى حيث أن أليكس تراعي جميع مستويات الطلاب

12. في رأيك، ما هي العوائق أو التحديات الرئيسية التي يواجهها المعلمون عند استخدام ميزات منصة ALEKS؟ كيف يمكن التغلب على هذه التحديات؟

كما ذكرت سابقاً، كانت الاجابات الدقيقة التي يطلبها ALEKS بمثابة عائق تغلبنا عليه من خلال إعطاء الطلاب استراتيجيات وتدريبهم على استخدام هذه الاستراتيجيات.

بالإضافة للمشاكل التقنية التي نصادفها في بعض الأحيان

13. قبل أن نختم، هل هناك أي شيء آخر تود إضافته أو مشاركة رؤى إضافية؟

لا. شكرا

Teacher 1 translated interview

1. I would like to start by asking you to kindly introduce yourself and share a brief about your educational background and your role as a teacher.

My name is Omar Bani Khalaf from Jordan. My educational experience is 15 years in teaching. I started teaching in Jordan in 2009. I worked at Sattam University, where I taught organic chemistry to preparatory year students for medicine and pharmacy students for two

years. Then I moved to work in the Ministry of Education in the Emirates, and this is my sixth year in the Ministry of Education in the Emirates.

2. Can you please tell me about your experience using ALEKS platform in your classroom?

Currently, ALEKS platform is a very distinctive platform, frankly. It has many features that help the teacher and student to achieve learning outcomes. I started using ALEKS platform about four years ago. For the past three years, I started using it regularly and effectively. It helps me a lot in writing tests, preparing for the lesson, and extracting the learning outcomes for each lesson. In addition, it assists me in writing worksheets for the students and having these worksheets marked very smoothly and quickly.

3. How do you perceive ALEKS features? Do these features support students' SRL?

ALEKS platform enables us to create assignments, worksheets, and grade books. This serves as a backup copy of the student's level, enabling us to better follow the student during the academic year, and through it, we can determine the student's strengths and weaknesses and how they will be addressed.

4. How do you integrate ALEKS platform into your lesson planning and teaching practices, specifically to support students' SRL?

Currently, as you know, we are required by the Ministry to use more than one platform (Alef, ALEKS, Inspire). Almost, but not entirely, I do not use ALEKS platform for every lesson,

but I rely on ALEKS by 25 to 40% to prepare lessons. Since the class session includes activities, I often use the ALEKS platform for the closing activity.

Student progress reports are necessary for the teacher to follow up on so that he can know the student's progress. If I find that the student has not achieved one of the learning outcomes, I encourage the student to solve the activity again and try to solve similar questions to achieve the learning outcome.

5. In light of your experience, which of ALEKS features had the greatest impact in enabling students to take ownership of their learning process?

The feature that I find most compelling in ALEKS is the assignments, as the student solves these assignments on his own, and we, the teachers, know the level of the student through ALEKS's reports. Of course, the reports feature also enables us to see the student's exact level.

6. In your opinion, which particular features of ALEKS platform had the most significant impact in enhancing students' SRL? How do these features fit into your educational strategies and goals?

Through the homework assignments which we give the students to solve individually, we achieve the outcomes that we aspire to during the class session.

7. Can you provide examples or share specific instances where you have successfully used features in ALEKS platform to enhance students' SRL?

Several students have benefitted from ALEKS platform, which has provided them with multiple examples, exercises, and various models at different difficulty levels. As a result, the students have demonstrated an improvement in their academic performance and a significant enhancement in their understanding of the subject and its underlying concepts.

8. How do you evaluate students' SRL skills while using ALEKS platform?

To begin with, the student perceives some of ALEKS's traits as challenging when it comes to achieving a high score on the progress tracking scale.

Additionally, the feature of badges and rewards linked to the student's progress motivated the student to continue performing the ALEKS exercises and complete all the required tasks.

9. What challenges, if any, did you face while using ALEKS platform? How did you deal with these challenges?

Students faced a problem in ALEKS for Chemistry, especially in asking the student to write the final result using "significant figure."

This caused concern for the student from ALEKS, as the student's complete answer was considered incorrect due to tenths of a percentage. These fractions are indeed necessary to solve all questions, especially in chemistry.

To meet this challenge, I provided the students with exercises and strategies that would enable them to deal with ALEKS, especially to reach the required solution with the required accuracy.

10. How do you see students' perceptions and opinions towards using the ALEKS platform features for their SRL?

Sometimes, students view ALEKS platform as an additional burden as they are required to do other activities, projects, and assignments. However, some student's time management skills enabled them to benefit from ALEKS's features to support their self-learning process.

11. Do you think ALEKS platform has increased the gap between students at different levels?

On the contrary, the students' solving of the tasks assigned to them through ALEKS platform brings all students to an advanced and near-level stage, as ALEKS takes into account all levels of students.

12. In your opinion, what are the main barriers or challenges that teachers face when using ALEKS platform features? How can these challenges be overcome?

As previously stated, the exact responses ALEKS demands can present a challenge. However, we have developed strategies to aid students in overcoming this obstacle and have provided them with the necessary training to utilize these strategies effectively.

Additionally, there are technical issues that might be encountered.

13. Is there anything else you'd like to add or share before we conclude?

No. Thanks.

Teacher 2 transcribed interview

13. هل يمكنك البدء من فضلك بتقديم نفسك ومشاركة بعض المعلومات عن خلفيتك في مجال التعليم ودورك كمعلم؟

اسمي مهند جميل محمود أبوفايدي . موظف بمؤسسة الإمارات للتعليم ومدرس مادة الرياضيات منذ العام 2019
مدرس للقسم المتقدم وقسم النخبة.

14. هل يمكنك أن تخبرني عن تجربتك في استخدام منصة أليكس في فصلك الدراسي؟

بدأنا باستخدام منصة أليكس خلال فترة الباندايم قبلها بعام بدأنا التدريب على استخدام المنصة وقمنا باستخدامها

وبدأنا باستخدامها للتقييمات وعمل الاختبارات واستفدنا منها جدا خلال فترة الباندايم و حتى بعد كورونا
و بعد إصدار التحديث الأخير إلى الآن نستخدمها في التقييم التكويني للطلاب و في فترة الاختبارات نستخدمها
للاختبارات.

15. كيف تصف ميزات منصة أليكس الرئيسية؟ هل تدعم هذه الميزات تعزيز تعلم الطلاب الذاتي ؟

مبدئيا أصف المنصة بأن هدفها الرئيسي تقييم الطالب على مراحل متعددة خلال دراسته للمنهج الدراسي
يعني مثلا لو احتجنا ان نقيم الطالب بمهارة معينة خصوصا تدريب الطلاب على أسئلة ال free response الأسئلة
التي تحتاج حل من الطالب و ليس فقط أسئلة الخيار المتعدد أو الجواب المباشر هنا يظهر دور أليكس حيث أن
الطالب يتدرب على حل هذه الأسئلة بنفسه حيث أنه لا يمكن إيجاد حل هذه الأسئلة ببساطة باستخدام الآلة الحاسبة
أو البحث عن الإجابة باستخدام الانترنت. بل إن أليكس يطالب الطالب بحل هذه الأسئلة بالتفصيل بمعنى آخر تركز
على استراتيجية حل المسائل لدى الطلاب وتنميتها وتركز على تفاصيل حل المسألة.

كما أن أليكس تساعد المعلم أولا في تقسيم المنهج وكيف من الممكن اختبار الطالب باستخدام أليكس

وأليكس تساعد الطالب أيضا على تحديد أهدافه الدراسية من خلال تقسيم المنهج على دروس أو أجزاء أو
بمعنى آخر وضع خطة دراسية للطلاب.

16. كيف يمكنك دمج منصة ALEKS في تخطيط الدروس وممارسات التدريس لديك، وتحديدًا لدعم تعلم الطلاب
ذاتي التنظيم؟

هناك تقييم للطلاب خلال كل مرحلة من الدرس هناك أسئلة من الحياة العملية أو أسئلة مباشرة بهذه الحالة
أقوم باستخدام أليكس لاختبار إن كان الطالب قد استوعب الأمثلة المطروحة خلال الدرس. كما أنني أقوم باستخدامه
للأنشطة خارج الحصة. فباستخدام أليكس Pie التي تقيس مدى تقدم الطالب في الرياضيات خلال مراحل الدراسة
كلها وليس فقط لهذا المنهج.

17. في ضوء تجربتك، أي من هذه الميزات كان لها تأثير أكبر في تمكين الطلاب من تحمل مسؤولية عملية تعلمهم؟

أليكس برأيي أستطيع أن أوصفها كمعلم إلكتروني للطالب لأنه الطالب خلال فترة تعلمه تقوم أليكس بتحديد المهارات التي تنقص الطالب وتعلمه كيف يطورها. وتقيس مدى تعلمه بعد عملية التعليم. مدى تطور فهمه للمادة. في حال لم يحقق الطالب المستوى المطلوب للتعلم فإن أليكس توجه الطالب لإعادة التمارين المتعلقة بالمادة التي لم يحقق بها الطالب المستوى المطلوب من الفهم والاتقان.

18. في رأيك، ما هي الميزات الخاصة في منصة أليكس التي كان لها تأثير أكبر في تعزيز تعلم الطلاب الذاتي؟ وكيف تتناسب هذه الميزات مع استراتيجياتكم وأهدافكم التعليمية؟

أليكس Pie تضع هدف وتحدي للطلاب بالإضافة إلى most ready to learn تضع خطة منظمة للطلاب

19. هل يمكنك تقديم أمثلة أو مشاركة حالات محددة حيث استخدمت الميزات في منصة أليكس بنجاح لتعزيز تعلم الطلاب الذاتي؟

نعم هناك قصة نجاح. قبل تقريبا سنتين كان عندي طلاب حاولت أن أجعل جزء من علامة الرياضيات تعتمد على أليكس Pie نفسها. أن يقوم الطلاب بإنهائها تماما و بالفعل بعض الطلاب حققوا نسبة 100% في أليكس Pie وبعد هذا الإنجاز لاحظت على هؤلاء الطلبة في السنوات المتقدمة " حيث أنني استمررت في تدريسهم أربع سنوات على التوالي " وجدت فارق كبير بمستوى الطلبة الذين أنجزوا 100% قبل و بعد اكمالهم لأليكس Pie مما أثر على علاماتهم النهائية .

بالإضافة إلى استخراج تقارير ALEKS وترجمتها إلى تقارير أبسط بحيث يفهمها الطالب وولي الأمر و مشاركتها أسبوعيا لمعرفة مدى تقدم الطالب

20. كيف تقوم بتقييم مهارات تعلم الطلاب الذاتي أثناء استخدام منصة أليكس؟

أليكس لها تأثير إيجابي بتنمية التعلم الذاتي لدى الطالب.

21. ما هي التحديات، إذا وجدت، التي واجهتها أثناء استخدام منصة أليكس؟ وكيف تعاملتم مع هذه التحديات؟

هناك تحديات واجهناها كمعلمين وتحديات أخرى واجهها الطلاب. من التحديات التي واجهها الطلاب كان عندهم صعوبة في بعض الأحيان حيث أن منصة أليكس تحتاج في بعض الأحيان لكل سؤال معين إجابة معينة و دقيقة يعني لا توجد مرونة في حل المسائل الرياضية. إذا لم يقم الطالب بإيجاد الناتج النهائي الصحيح تخضم له كل علامة السؤال كاملة. يعني في الحالات العادية عند قيامنا بتصحيح مسائل free response و أليكس متخصص بهذا النوع من الأسئلة فإننا نحتسب للطلاب درجات خطوات الحل ولكن أليكس يقوم باحتساب درجة 0 للطالب في حالة لو كانت الإجابة النهائية غير صحيحة. نجد أن هذا الأمر يشكل تحدي و غير عادل بالنسبة للطالب . و بالنسبة للتحديات التي واجهناها كمعلمين هي الانقطاعات في استخدام أليكس بسبب تحديثات للبرنامج مما يتسبب

بإرباك لمخططاتنا التدريسية والتوجه للبحث عن منصات أخرى.

22. كيف ترى تصورات وآراء الطلاب تجاه استخدام ميزات منصة أليكس لتعلمهم الذاتي؟
حسب الطالب . ولكن الأغلب لديهم مشكلة كما ذكرت سابقا و هي أن يكون الجواب النهائي للمسألة صحيح high precise

أما بالنسبة لأليكس Pie كان لها أثر إيجابي على الطلاب حيث أنني وجدتهم قد أحبوا هذا التحدي وحققوا متابعة تقدم الطلاب على المدى الطويل

23. هل تعتقد أنه منصة أليكس زادت الفجوة بين الطلاب بالمستوى المتقدم والمستويات الأقل بالعكس أليكس قلست الفجوة بين مستويات الطلاب. العديد من الطلاب كان لديهم فجوة خصوصا في فترة الباندا ميك أليكس ساعدتنا في تقليص هذه الفجوة واعتمدنا عليها بشكل رئيسي

24. في رأيك، ما هي العوائق أو التحديات الرئيسية التي يواجهها المعلمون عند استخدام ميزات منصة ALEKS؟
كيف يمكن التغلب على هذه التحديات؟
حاليا لا توجد أية عوائق

قبل أن نختم، هل هناك أي شيء آخر تود إضافته أو مشاركة رؤى إضافية؟

لا شكرا

Teacher 2 translated interview

1. I would like to start by asking you to kindly introduce yourself and share a brief about your educational background and your role as a teacher.

My name is Muhannad Jamil Mahmoud Abu Fedi. An employee of the Emirates School Establishment and a mathematics teacher since 2019.

Instructor for the advanced section and the elite section.

2. Can you please tell me about your experience using ALEKS platform in your classroom?

We started using ALEKS platform during the Pandemic period. A year before that, we began training on using the platform and have used it actively ever since.

We started using it for evaluations and tests. We extremely benefited from ALEKS during the Pandemic period, and even after Corona and after the release of the latest update. Until now, we have been using ALEKS in the formative assessment. During the examination periods, we use it for tests.

3. How do you perceive ALEKS features? Do these features support students' SRL?

Initially, I describe the platform as its primary goal to evaluate the student at multiple stages during his curriculum study. This means, for example, if we need to assess students with a particular skill, especially training students on free response questions, questions that require a solution from the student, and not just multiple choice questions or direct answers, here ALEKS role comes into play. As ALEKS trains the student to solve these questions himself, as the solution to these questions cannot be found simply by using a calculator or searching for the answer using the Internet. Instead, ALEKS asks the student to solve these questions in detail, in other words, focusing on and developing the students' problem-solving strategy and focusing on the details of solving the problem.

ALEKS also helps the teacher in dividing the curriculum and how it is possible to test the student using ALEKS

ALEKS also helps the student determine his academic goals by dividing the curriculum into lessons or parts, or in other words, developing a study plan for the student.

4. How do you integrate ALEKS platform into your lesson planning and teaching practices, specifically to support students' SRL?

There is an evaluation of the student during each stage of the lesson. There are questions from practical life or direct questions. In this case, I use ALEKS to test whether the student has understood the examples presented during the lesson. I also use it for activities outside of class. By using ALEKS Pie, which measures the student's progress in mathematics during all stages of study, not just this curriculum.

5. In light of your experience, which of ALEKS features had the greatest impact in enabling students to take ownership of their learning process?

I believe that ALEKS can be described as an electronic tutor for students. During the learning process, ALEKS can identify the skills that the student is lacking and teach them how to develop those skills. After the learning process, ALEKS measures the extent of the student's learning and understanding of the subject. Suppose the student does not achieve the required level of learning. In that case, ALEKS directs them to repeat exercises related to the subject in which they did not achieve the necessary level of understanding and mastery.

6. In your opinion, which particular features of ALEKS platform had the most significant impact in enhancing students' SRL? How do these features fit into your educational strategies and goals?

ALEKS Pie sets a goal and challenge for the student, in addition to "the most ready to learn" feature, which establishes a plan for the student.

7. Can you provide examples or share specific instances where you have successfully used features in ALEKS platform to enhance students' SRL?

Yes, there is a success story. About two years ago I tried to base part of my students' math grade on ALEKS Pie completion. Some students actually achieved 100% of ALEKS Pie. After this achievement, I noticed that these students in subsequent years, "as I continued to teach them four years in a row", I found a big leap in the level of students who achieved 100% before and after they completed ALEKS Pie, which affected their final grades.

In addition to extracting ALEKS reports, translating them into simpler reports that the student and guardian can comprehend, and sharing them weekly to monitor the student's growth.

8. How do you evaluate students' SRL skills while using ALEKS platform?

ALEKS has a positive impact on developing students' self-regulated learning.

9. What challenges, if any, did you face while using ALEKS platform? How did you deal with these challenges?

There are challenges we have faced as teachers and other challenges students have encountered. One of the challenges that students faced was that they sometimes had difficulty, as ALEKS platform sometimes requires a specific and accurate answer for each question, meaning there is no flexibility in solving mathematical problems. If the student does not provide the correct final result, the entire question mark will be deducted. In other words, normally when we mark free response problems, and ALEKS specializes in this type of questions, we calculate

the students' grades for the solution steps, but ALEKS calculates a grade of 0 for the student if the final answer is incorrect. We find that this is challenging and unfair for the student.

As for the challenges that we faced as teachers, the interruptions in the use of ALEKS due to updates to the program, which disrupts our teaching plans and leads us to search for other platforms.

10. How do you see students' perceptions and opinions towards using ALEKS platform features for their SRL?

Depends on the student. But most students have a problem, as I mentioned previously, that the final answer to the question should be correct and highly precise.

As for ALEKS Pie, it positively impacted the students, as I found that they liked this challenge, and it has achieved continuous progress in the student's level and attainment in the long term.

11. Do you think ALEKS platform has increased the gap between students at different levels?

On the contrary, ALEKS narrowed the gap between students' levels, especially during the pandemic lockdown. A significant number of students have been found to have gaps in their knowledge levels. However, ALEKS has narrowed this knowledge gap. ALEKS became our primary resource in this regard.

12. In your opinion, what are the main barriers or challenges that teachers face when using ALEKS platform features? How can these challenges be overcome?

Currently, there are no obstacles.

13. Is there anything else you'd like to add or share before we conclude?

No. Thanks.

Appendix D: Qualitative data thematic analysis

Interviews Analysis		
Chunks	Code	Theme
Teacher 1 1-It helps me a lot in writing tests, preparing for the lesson, and extracting the learning outcomes for each lesson. In addition, it assists me in writing worksheets for the students and having these worksheets marked very smoothly and quickly. ALEKS platform enables us to create assignments, worksheets, and grade books. Student progress reports are necessary for the teacher to follow up on so that he can know the student's progress. If I find that the student has not achieved one of the learning outcomes, I encourage the student to solve the activity again and try to solve similar questions to achieve the learning outcome. The feature that I find most compelling in ALEKS is the assignments, as the student solves these assignments on his own.	Assessment Learning outcomes Conceptual understanding Student progress Independent learning Modelling Challenges Motivation Frustration Gap Reduction	- Students' independent learning and autonomy. - Student progress and comprehension status. - Motivation and challenge. - Frustration and flexibility. - Problem solving strategies. - Challenges in Implementing ALEKS - Iterative learning Gap Reduction

the reports feature also enables us to see the student's exact level. which has provided them with multiple examples, exercises, and various models at different difficulty levels. As a result, the students have demonstrated an improvement in their academic performance and a significant enhancement in their understanding of the subject and its underlying concepts. student perceives some of ALEKS's traits as challenging when it comes to achieving a high score on the progress tracking scale. the feature of badges and rewards linked to the student's progress motivated the student to continue performing the ALEKS exercises and complete all the required tasks. Students faced a problem in ALEKS for Chemistry, especially in asking the student to write the final result using "significant figure." This caused concern for the student from ALEKS, as the student's complete answer was considered incorrect due to tenths of a percentage.		
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To meet this challenge, I provided the students with exercises and strategies that would enable them to deal with ALEKS, especially to reach the required solution with the required accuracy. the exact responses ALEKS demands can present a challenge. the students' solving of the tasks assigned to them through ALEKS platform brings all students to an advanced and near-level stage, as ALEKS takes into account all levels of students.		
Teacher2 We started using it for evaluations and tests. Until now, we have been using ALEKS in the formative assessment. During the examination periods, we use it for tests.	Assessment Student Progress Modelling Independent learning Motivation Strategic planning Goal-setting	• Students' independent learning and autonomy. • Student progress and comprehension status. • Motivation and challenge. • Frustration and flexibility. • Problem solving strategies. • Goal-setting and strategic planning. • Iterative learning • Gap Reduction • ALEKS Features Effective Implementation Hurdles.

ALEKS asks the student to solve these questions in detail, in other words, focusing on and developing the students' problem-solving strategy and focusing on the details of solving the problem. I describe the platform as its primary goal to evaluate the student at multiple stages during his curriculum study. especially training students on free response questions, questions that require a solution from the student, and not just multiple choice questions or direct answers, here ALEKS role comes into play ALEKS asks the student to solve these questions in detail, in other words, focusing on and developing the students' problem-solving strategy and focusing on the details of solving the problem. ALEKS also helps the teacher in dividing the curriculum. ALEKS also helps the student determine his academic goals. by dividing the curriculum into lessons or parts, or in other	Challenge Problem solving strategies Frustration Iterative Learning Gap Reduction Obstacles	
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words, developing a study plan for the student. ALEKS can identify the skills that the student is lacking and teach them how to develop those skills. ALEKS Pie sets a goal and challenge for the student, in addition to “the most ready to learn” feature, which establishes a plan for the student. Some students actually achieved 100% of ALEKS Pie. After this achievement, I noticed that these students in subsequent years, “as I continued to teach them four years in a row”, I found a big leap in the level of students who achieved 100% before and after they completed ALEKS Pie, which affected their final grades. as ALEKS platform sometimes requires a specific and accurate answer for each question, meaning there is no flexibility in solving mathematical problems. If the student does not provide the correct final result, the entire question mark will be deducted. As for ALEKS Pie, it positively impacted the students, as I found that they liked this challenge, and it has achieved continuous progress in the student’s level and attainment in the long term.		
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ALEKS narrowed the gap between students' levels, especially during the pandemic lockdown. A significant number of students have been found to have gaps in their knowledge levels. However, ALEKS has narrowed this knowledge gap. ALEKS became our primary resource in this regard. As for the challenges that we faced as teachers, the interruptions in the use of ALEKS due to updates to the program, which disrupts our teaching plans and leads us to search for other platforms.		
Open-ended Inputs		
Teacher 3 adding to this because ALEKS is not just MCQs and fill in the blank type questions students either give up or don't want to do the work to get the answers. It is generally the higher achieving students who like using ALEKS and REVEAL because it gives them more of a challenge. I have had students in the past in Grade 9 Advance who have said they preferred ALEKS to the other platform because it gives them explanations and examples to understand the content.	Frustration Challenge Problem solving strategies Obstacles	• Students' independent learning and autonomy. • Motivation and challenge. • Frustration and flexibility. • Problem-solving strategies. • ALEKS Features Effective Implementation Hurdles.

The main problem I have with implementing it effectively is that our school has insisted on ALEF being the main platform of use. So this leave us with little time to use ALEKS effectively and secondly, because the school has emphasized the importance of the other platform the majority of students are reluctant to work on ALEKS		
Teacher 4 It is equally important to highlight the pivotal role of the educator in using the reporting functionalities in ALEKS to enhance and deepen students' learning.	Student progress	• Student progress and comprehension status.
Teacher 5 in spite of the highly expected outcomes of employing all the mentioned features, the utilization would still be hard considering teachers' limited time.	Obstacles	• ALEKS Features Effective Implementation Hurdles.

Appendix E: Teachers' approvals


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47 KB

الأستاذ المحترم عمار

أمل أن تكون بخير. أكتب لطلب موافقتك على تضمين إجابات مقابلاتك في أطروحتي. سيتم الإشارة إليك بشكل مناسب وسريّة تامة، وقد تم إرفاق نسخة مكتوبة للمقابلة. أرجو منك الرد بأسرع وقت ممكن

شكراً جزيلاً على تعاونك

أطيب التحيات،
تسليم المصري

Dear Mr. Omar

I trust this message finds you well. I am writing to express my gratitude for your participation in the recent interview. Your insights and responses have proven invaluable to my research.

I have transcribed our interview, and I am in the process of finalizing my dissertation. As a courtesy, I am seeking your consent to include your interview responses in my dissertation. Your contributions will be cited appropriately, and any personal information will be treated with the utmost confidentiality.

Your prompt response and cooperation in granting consent would be greatly appreciated. If you have any concerns or would like further details, please do not hesitate to reach out.

Thank you once again for your time and valuable input. I look forward to your positive response.

Best regards,

Tasneem AlMasri
20002417@student.buid.ac.ae
 Supervisor email: christopher.hill@buid.ac.ae

You have my consent to enter my interview responses in your dissertation. All the best and feel free to get back to me for further information.

Best Regards,



الأستاذ المحترم مهنا

أمل أن تكون بخير. أكتب لطلب موافقتك على تضمين إجابات مقابلتك في أطروحتي. سيتم الإشارة إليك بشكل مناسب وبسرعة تامة. وقد تم إرفاق نسخة مكتوبة للمقابلة. أرجو منك الرد بأسرع وقت ممكن.

شكراً جزيلاً على تعاونك

أطيب التحيات،
تسليم المصري

Dear Mr. Mohannad,

I trust this message finds you well. I am writing to express my gratitude for your participation in the recent interview. Your insights and responses have proven invaluable to my research.

I have transcribed our interview, and I am in the process of finalizing my dissertation. As a courtesy, I am seeking your consent to include your interview responses in my dissertation. Your contributions will be cited appropriately, and any personal information will be treated with the utmost confidentiality.

Your prompt response and cooperation in granting consent would be greatly appreciated. If you have any concerns or would like further details, please do not hesitate to reach out.

Thank you once again for your time and valuable input. I look forward to your positive response.

Best regards,

Tasneem AlMasri
20002417@student.buid.ac.ae
 Supervisor email: christopher.hill@buid.ac.ae

Subject: RE: Request for Consent: Inclusion of Interview Responses in Dissertation

السلام عليكم ورحمة الله
 أمل أن تكون بصحة جيدة. أوافق على تضمين اجاباتي في الأطروحة الخاصة بك وأتمنى لك التوفيق. علما أنني متوافر في حالة الحاجة إلى أي استفسار آخر.
 أطيب التحيات

Appendix F: BUiD letter



5 June 2023

To whom it may concern

This is to certify that Miss Tasneem AlMasri with Student ID number 20002417 is a registered student in the Master of Education in Information and Communication Technology programme at The British University in Dubai.

Miss. AlMasri is working on his research titled “Exploring Teachers’ Utilization of Adaptive Learning Platform Features to Foster Students’ Self-Regulated Learning: A Focus on ALEKS Platform”. She is required to gather data through surveys.

Your permission for her to conduct research in your organisation is hereby requested. Any support provided to her in this regard will be highly appreciated.

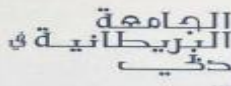
This letter is issued at Miss AlMasri’s request.

Yours sincerely,

The block contains a handwritten signature in blue ink, which appears to read 'Mira Hamzeh', and an official circular stamp of The British University in Dubai. The stamp includes the university's name in Arabic and English, its PO Box 345015, and its location in Dubai, UAE.

Mira Hamzeh
Head of Marketing, Admissions & Student Services
The British University in Dubai

Appendix G: BUiD ethical approval letter




The British University
in Dubai

www.buid.ac.ae

The British University in Dubai
Block 11, First and Second Floor
Dubai International Academic City
Dubai
United Arab Emirates

Sunday 11th June 2023

Tasneem Al Masri Ethical Approval

My name is Prof Christopher Hill and I am writing this letter in my capacity as Professor, Faculty of Education, The British University in Dubai and Tasneem Al Masri's Dissertation Supervisor.

Tasneem has received full ethical approval to conduct her dissertation research and has the full support of BUiD in this endeavor. Tasneem fulfilled all necessary components of our ethical review, including the design and presentation of her work, a panel review and final approval.

I ask that you offer any support possible to ensure that Tasneem is able to access and obtain the necessary data for her research activity.

Please do not hesitate to get in touch should you require any further details or clarification.

Yours sincerely,



Prof Christopher Hill
Faculty of Education
The British University in Dubai
Christopher.hill@buid.ac.ae



P O Box 345015 - Block 11 Dubai International Academic City Dubai UAE • T +971 4 279 1400 • F +971 4 279 1490

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Appendix H: ESE circulated facilitation letter

 مؤسسة الإمارات للتعليم المدرسي EMIRATES SCHOOLS ESTABLISHMENT	 United Arab Emirates
Facilitating a researcher's study Tasneem AlMasri from The British University in Dubai	تسهيل مهمة الباحثة تسنيم المصري من الجامعة البريطانية بدبي
Dear School and Kindergarten Principals, The Emirates Schools Establishment is pleased to extend its best wishes. The researcher study Tasneem AlMasri is conducting a research study from The British University in Dubai. The researcher is currently in the process collecting data for her research dissertation titled " Exploring Teachers' Utilization of Adaptive Learning Platform Features to Foster Students' Self-Regulated Learning: A Focus on ALEKS Platform". Therefore, we would like all school to facilitate this task in collecting the data for her final research. Please note that all information will be kept confidential and will only be used for scientific research and development purposes. Teacher's Questionnaire: https://bit.ly/3pfPWsr For further information, please contact : Tasneem AlMasri : 20002417@student.buid.ac.ae Best Regard	السادة/ مديرو المدارس ورياض الأطفال المحترمين تحية طيبة وبعد ... يسر مؤسسة الإمارات للتعليم المدرسي أن تهديكم أطيب التحيات. تقوم الباحثة تسنيم المصري من الجامعة البريطانية بدبي بعمل دراسة بحثية، حيث إن الباحث حالياً يصعد جمع البيانات للبحث بعنوان: "استكشاف استخدام المعلمين لميزات منصة أليكس؛ لتعزيز تعلم الطلبة الذاتي المنظم". وعليه ندعو جميع المدارس بتسهيل مهمة الباحثة لتنفيذ الدراسة في المدرسة علماً أن جميع إجاباتكم ستكون سرية وستضيف قيمة إلى نتائج هذا البحث الذي سيتم استخدامه لأغراض البحث العلمي والتطوير الأكاديمي الاستشارة للمعلمين: https://bit.ly/3pfPWsr لمزيد من المعلومات يرجى التواصل مع : تسنييم المصري : 20002417@student.buid.ac.ae مع وافر الشكر والتقدير
 ese_ae  ese.ae  ese.gov.ae  ملاحظة: محتوى هذا البريد الإلكتروني ومرفقاته حقوق محفوظة © لمؤسسة الإمارات للتعليم المدرسي في دولة الإمارات العربية المتحدة، ومُرسل حصراً لموظفي المؤسسة بهدف التواصل الداخلي؛ يُحظر إعادة توزيع أو نشر جزء أو كل المحتوى بأي شكل من الأشكال، أو التواصل كتابياً أو شفهاً بمحتواه، مع أي جهة خارجية إلا بإذن مسبق من إدارة المؤسسة، علماً بأن القيام بأي فعل مخالف لما تم توضيحه أنفاً يعرّض المخالف للمساءلة القانونية. Note: The content of this electronic mail is Copyright® of Emirates Schools Establishment in the United Arab Emirates, and sent exclusively to the Establishment' employees for the purpose of internal communication. It is prohibited to redistribute or publish part or all this content in any way or communicate it to any external party without prior permission from the Establishment. Any action contrary to what has been explained above exposes the violator to legal accountability.	