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Hackathon

Supporting all students (traditional and apprentices) in a digital age

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Abstract
Inclusive education is paramount as part of DEI (Diversity, Equity, and Inclusion). We address concerns related to creating support mechanisms for diverse students, its impact on staff and the student cohort. The impact on staff is related to the increased person hours and funds allocated for HE to incorporate National DEI guidelines, along with the effect on staff emotional wellbeing. An inclusive environment is suggested; challenges include language barriers, attention spans, and time taken to comprehend difficult topics. An innovative framework based on integration of UDL (Universal Design of Learning) and LIDA (Learning in Digital Age) called SSIL – Support Spectrum for Inclusive Learning. SSIL discusses a suggested staff skillset plan for UDL readiness and adoption, and an understanding of the different student needs to promote inclusivity along with the effect upon staff. The pilot as conducted with Level 4 Computing students, the results are exclusively focused considering prior knowledge of the digital tools. The results showed positive student feedback, and an approved framework/guidelines with benefit academics. Future work will add extended UDL practices multiple ways of action/expression, flexible assessment approaches enabling students to choose modes of assessment submission, for example, by video, audio, or written submissions. *Note: the term student encompasses on campus, FT/PT, DL, and apprenticeships.*

Keywords

Universal Design of Learning (UDL), Learning Environment (LE), Learning Inclusion in Digital Age (LIDA), Staff skillset plan, Teaching and Learning (TandL)

1. Introduction

HE (Higher Education) providers disclose their inclusivity statements as a measurement of their wider professional practice and impact within society. To support organisations in particularly HE, universities in achieving these KPIs, academics play a significant and vital role. This study (support spectrum) is an exploration of the opportunities and challenges faced by academics attempting to create an effective and inclusive learning environment. We seek to address concerns related to creating support mechanisms for diverse students but also its impact on the staff and other students in the cohort. The impact of additional support responsibilities on staff may include increased work loading hours and funds allocated for HE sectors to incorporate National DEI guidelines, which could lead to staff emotional wellbeing issues. To create an inclusive environment for diverse students, the challenges include language barriers, attention spans, and time taken to comprehend difficult topics. Our work presents an innovative framework based on integration of UDL (Universal Design of Learning) and LIDA (Learning in Digital Age) called SSIL – Support Spectrum for Inclusive Learning. SSIL not only promotes inclusivity for students but also staff members. SSIL represents a suggested staff skillset plan for UDL readiness and adoption, alongside an understanding of the differing student needs.

The abovementioned challenges related to language barriers and attention spans can be addressed using digital tools and carefully constructed guided activities stemming from LIDA. Alternatively, UDL allows tutors to develop flexible learning and assessment policies in their curriculum delivery. However, this increases the staff effort and time required to compile extra guided activities along with awareness of evolving digital platforms and UDL practices. The continuous effort for keeping up with the DEI landscape will be supported by the usage of staff's skillset development plan.

The current observational study is trailed on Level 4 Computing students and could be expanded to include wider and versatile groups such as different disciplines/levels full-time students and apprentices. The results from the study are exclusively focused on students enrolled on computing courses having prior knowledge of digital tools. In terms of inclusivity, the core criterion addressed in this study/practice is the students English as an Additional Language (EAL) and disability. The most prevalent issue in these scenarios is supporting the students' ability to communicate effectively, these could be in terms of English as a second language, neurodiversity etc. The results show incorporation of SSIL in the teaching practice leads to positive student feedback, particularly for indicators such as availability of learning material, support provided, clear guidelines, availability of lecture recordings, and extra support material for students with diverse needs. The paper may benefit academics looking for guidelines on how to support diverse students. Future directions of this work aim to add extended UDL practices multiple ways of action/expression, including flexible assessment approaches which enable students to choose the mode of their assessment submission, for example, by video, audio, or written submissions.

1.1. Widening Accessibility - Relevance

The study focuses on two specific diversity aspects for this observation; EAL and neurodiversity (Autism, ADHD, Dyslexia and Dyspraxia). Keeping these in mind, the challenge is to create supportive and engaging environment for both students and tutors. To address this challenge, the research questions (RQs) are as follows:

RQ 1. How to create effective and inclusive learning environments based on the tech tools in the modern HE landscape?
RQ 2. What are the curriculum design considerations considering UDL and LIDA to cater needs of EAL and neurodiverse learners in HE?
RQ 3. How to assist staff to ensure they are equipped with relevant skillset to support inclusion in their practice?

The study therefore has the following objectives:

RO 1. Incorporation of integrated multimedia tech tools already available in the organisation to support needs of diverse learners requiring support with listening and speaking skills.
RO 2. Integrative exploration of UDL & LIDA into practice by introducing multiple ways of engagement, representation, and assessment in compliance with the curriculum.
RO 3. Identification of the need of resource development, expert support, and consultation for staff to ensure inclusion in HE classroom.

The paper is organised to discuss the proposed support spectrum considering the internationally accepted flexible teaching and learning and frameworks supporting all learners. Section 3 explores a specific lecture where a peer-observation was conducted to observe the student response to teaching practice. Section 4 presents the details of peer-observation and the student feedback conducted at the end of semester. Finally, section 5 concludes the study by a reflection on feedback and future directions.

2. SSIL - Support Spectrum for Inclusive Learning

Figure 1 SSIL gives an overview of the framework that is suggested and how it combines LiDA, UDL and planning for the development of staff skillsets to produce increased numbers of successful and satisfied graduates.

Figure 1 SSIL

The SSIL framework places particular emphasis on learners from diverse backgrounds, addressing the specific support they require along with managing the work-based learning responsibilities, with a particular focus on apprentices. This approach not only fosters a sense of belonging and relevance but also supports the development of essential employability skills, for apprentices the focus being managing study and work together. Through tailored work-based learning support, the framework ensures that all students, regardless of their individual learning needs, are equipped to thrive both within higher education and in their future careers.

2.1. Support Mechanisms for Diverse Students - LIDA

LiDA (Learning in the Digital Age) refers to several initiatives that leverage digital tools of education, research, and professional development. Dobson et al., (2024) suggest that the inclusion model should have three features: Social Belonging, Digital Society and Finding a Voice. Other related research also emphasise belonging being crucial to keep learning policies, practices, and curriculum intact (Slee, 2019).

Barth, (1998) discussed boundaries of social belonging, identifying language and the associated potential barriers as a key issue. This emphasises the fact that a tutor should be proficient at the art of delivering the lecture universally to deliver the correct understanding of the topic at hand. However, consideration needs to be given to language barriers of the student and if this presents difficulties in engagement.

Historically, there has been a tendency towards taking a didactic, teacher led delivery style in lectures. These, however, need to support with related activities where a student can voice their opinions and enter discourse pertaining to their understanding to demonstrate participation (Losito et al., 2018). One approach to considering learner needs inclusively is LIDA (Figure 2, Dobson et al., 2024).

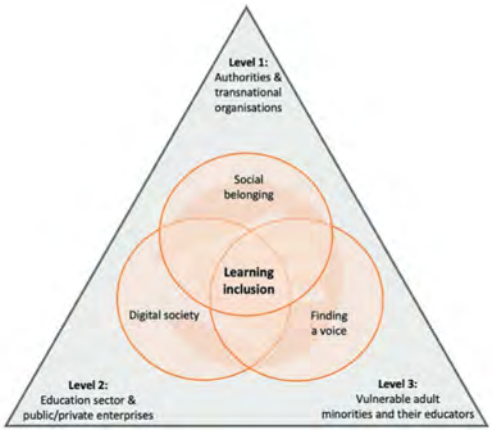

Figure 2 LIDA Model illustrating the relationship between themes under consideration (Reprinted from Dobson et al., 2024)

A study conducted specifically in UK landscape (Beetham et al., 2009), suggested an extension of LIDA. This extension adopts a comprehensive approach by addressing the diverse needs of various focus groups, ensuring that appropriate support mechanisms are in place to enhance their learning outcomes. The study included learners from 4 school students, 31 undergraduate students, 17 post graduate students, 4 remote and 8 staff development learners. The diverse audience validates the applicability of LIDA to increase the success rates among students. Innovative digital cultures study supporting 960 apprentices from economic background further reinforces the effectiveness of the LIDA approach not only with the increased satisfaction of learners provided pressures of internal development dynamics (Barabasch and Keller, n.d.).

2.2. Integrated UDL

UDL (Universal Design for Learning) is a framework to create inclusive learning environments, typically providing flexible options for the student to access, engage with and demonstrate their understanding (Mistry and Sutheswaran, n.d.). It leverages the neuroscience research to address learners' variability ("students with disabilities," "multilingual learners," or "gifted students"). CAST, as a pioneering nonprofit institution, researching and developing in education, created UDL to enforce curriculum and assessment flexibility, Figure 3 Core UDL shows this as a concept. This framework pivots on three core principles: Engagement, Representation, Action and and Expression (Mistry and Sutheswaran, n.d.). Pacheco-Guffrey, 2019), incorporated the finding voice aspect from the LIDA inclusive model, UDL can then be integrated in curriculum to cater needs of diverse students.

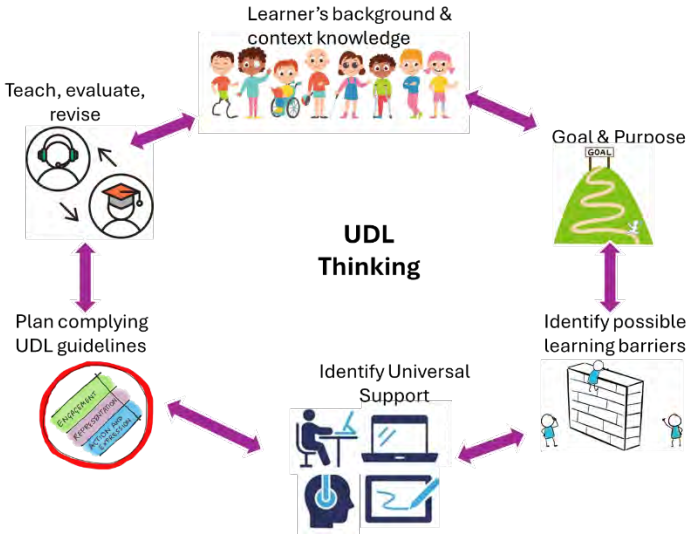

Figure 3 Core UDL

As much as UDL has solid theoretical backing, a reflective practice implementing UDL for apprentices' sheds light on the pedagogical differences among Irish Standards Based Apprenticeship (SBA) and Level 7 (L7) practical focused degree (Lawlor, 2021). The study explored usage of Multiple Means of Representation for L7 learners and concluded satisfactory results based on the student feedback. The reflection concludes with an emphasis on extensive practice of UDL in apprenticeship teaching. Another aspect of apprenticeship teaching is to bring all the stakeholders on the same page by co-designing the apprenticeship degrees in collaboration with the employers (Bravenboer, 2016). This will not only help promote higher-level skills required by employers, but it can also provide some insights regarding their respective apprentices during delivery of programmes. A policy-oriented research claims that inclusive apprenticeships have strong potential to advance employment equity, but only if stakeholders commit to long-term, coordinated efforts to make apprenticeship systems genuinely accessible and supportive. To overcome barriers associated with diverse students and work-based pathways strong partnerships among tutors, disability and apprenticeship communities are required (Mitchell et al., 2023).

2.3. Staff Skillset Plan

The incorporation of LiDA and UDL in an academic's teaching practice would appear straightforward, however there are several challenges associated with this integration into a framework. Landin and Schirmer (2020) discuss several indicators of an academic's preparedness to deliver courses that incorporate inclusion, these include the instructor's personal aspects (cultural background, formative experiences, and learning assumptions under subjective influence). instructors should know the student backgrounds to accordingly create relatable and from this, retainable learning materials keeping in mind learner's backgrounds and assumptions. Hammond (2014) suggests that an instructor should be willing to critique their own teaching styles and challenge them and move out of their comfort zone to embrace the inclusive teaching framework. This may potentially lead to an increase in preparation time and adoption of new skills because of the purposeful review. Figure 4 Staff Skillset Plan suggests a proposed SSIL method for upskilling staff.

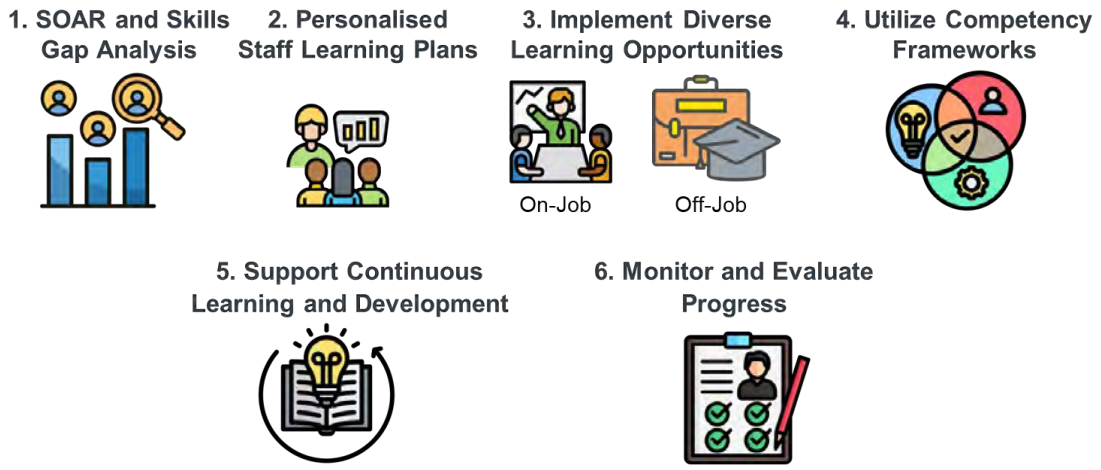

Figure 4 Staff Skillset Plan

SSIL recommends identifying the gap in an organisation's current capabilities and future goals by conducting SOAR analysis (Strengths, Opportunities, Aspirations, Results) (Councill et al., 2003). A skills gap analysis and one-to-one supervisions can be used to pinpoint areas where staff skills may not align with organisational objectives to develop Individual Learning Plans. These plans should consider mandatory training requirements and individual career aspirations, utilising available templates to structure them effectively. The third stage relates to implementation of diverse learning opportunities, incorporating both on-the-job and off-the-job learning. These steps help in assessing current competencies for inclusive teaching and learning and planning targeted development activities. This support through CPD with continuous monitoring and evaluation can adjust learning plans based on evolving needs and feedback.

3. Methodology and Foundational Backdrop

The proposed support spectrum framework SSIL has been implemented as pilot testing to validate the applicability by observing stakeholder feedback (learners and peers). The pilot test is focused on students enrolled in Level 4 of BSc Computer Science course, Back-end Development module, focusing the development of server-side systems. The observation was conducted in 2025. All participants in this pilot study identified themselves as digitally literate implying having background experience of using computing devices. Students' attained skillset and satisfaction levels are measured by three different identifiers, i.e., student feedback, mentor feedback, and student results.

To get a broader perspective on the usability of SSIL, a senior member of staff was invited to observe a session. Section 3.1 presents the details of session being observed.

3.1. Observation of teaching practice incorporating SSIL

The session encompassed different topics related to advanced Structured Query Language (SQL) and Hypertext Preprocessor (PHP) integration. Students were given all the resources prior to the session and the room included visual displays for lecture

delivery and example demonstrations along with separate computer to work on and follow the hands-on activities. The specific aims of the session included:

- Understand the usage of server-side programming in terms of customised retrievals and updates.
- Development and Deployment of the server-side program to develop a fully functional website.

To achieve the above aims the session included discussion of database management query mechanisms such as DML Statements (Delete and Update), Aggregate Functions (Count, Min, Max, Sum, Avg), Aliases, Mathematical Operations, Joins and related activities. Throughout the session students' active engagement was maintained. This was followed by an activity session to test the knowledge and skills related to the focused topic of the session.

4. Lesson Delivery Critical Analysis

This section critically analyses the goal attainment of supportive T and L environment formation by providing appropriate student support and guidance throughout the module delivery (multiple sessions). The delivered sessions used a range of methods of teaching and supporting learning, assessment, and feedback, appropriate to the learners, subject, and context, including use of appropriate technologies. The observer feedback presents the details for only one session whereas the learner's feedback is reflection of that individual session and the entire module delivery.

4.1. Observer Feedback

The observation and learner engagement review highlight a well-structured and clearly delivered session, with strengths in practical application, effective demonstrations, and individual learner support. Learners were engaged, particularly during hands-on SQL tasks, and benefitted from recaps that reinforced prior knowledge. However, whole-class participation was limited, suggesting a need for more inclusive questioning strategies such as rephrasing questions, increasing wait time, and using methods like Think-Pair-Share (Apriyanti and Ayu, 2020). Consistency in managing late arrivals and enhancing the accessibility of presentation materials were also noted as areas for development. Overall, the session was effective but could be further improved by fostering broader engagement and encouraging critical thinking through open-ended questioning.

4.2. Learner Feedback

Students were given different opportunities to provide feedback for the module delivery during and at the end of the module. The summary of learner feedback is as follows:

a. **Learning material**: All the topics were well covered, and concept was clear.
b. **Support provided**: This aspect of the course was particularly commendable. Both in-class and online support were consistently effective and timely. Questions and

concerns were addressed promptly, fostering a keen sense of accessibility and support throughout the course. The support system functioned exceptionally well.

c. **Clear guidelines**: Were well structured and instructions were useful for assessment.
d. **Assessment expectations**: Not always clear from the start but more clarity and examples helped.
e. **Availability of recordings and extra material**: Recordings were useful, but not for students who did not miss any classes. However, recordings were useful for revision.
f. **Other thoughts**:
    - Hands-on sessions were effective and helped a-lot and support in class was helpful as well.
    - Additional extra classes for students with LSPs (Learning Support Plans)
    - Add or show the visualisation of the coding by showing more examples or compile short clips of teaching a specific thing the way you get to see in the reels TikTok or Instagram.

4.3. Multi-source Findings

The qualitative data collected, encompassing both student and peer observation feedback, has been overwhelmingly positive and provides a robust foundation for evaluating the effectiveness of the teaching approach. Students have consistently praised the comprehensive support mechanisms in place, particularly valuing the accessibility of both in-class and online assistance, as well as the promptness with which their questions and concerns were addressed. The hands-on nature of the sessions has been repeatedly cited as a significant contributor to their understanding and engagement, enabling learners to consolidate theoretical knowledge through practical application. Students have also expressed appreciation for the additional support provided to those with Learning Support Plans (LSPs), and for the opportunity to revisit material via recordings and supplementary resources, which have proven especially useful for revision and for accommodating diverse learning needs.

Peer observations have further reinforced these findings, with colleagues commending the clarity and structure of instruction, the well-organised and useful guidelines provided for assessments, and the overall inclusivity of the learning environment.

Importantly, this qualitative feedback is complemented by quantitative outcomes. The implementation of the SSIL framework has directly correlated with an 80% pass rate for the module, a notable achievement that not only confirms the effectiveness of the approach but also underscores its positive impact on student achievement and retention. This convergence of qualitative and quantitative evidence affirms the framework’s applicability and responsive teaching practice in promoting academic success. Going forward, the continued integration of student and peer feedback, along with employers onboard in case of apprentices, will be instrumental in refining and enhancing the framework to further meet the evolving needs of a diverse student population.

5. Conclusive Reflection and Future Directions

For the observed teaching practice, LIDA, and UDL frameworks (Dobson et al., 2024) (Pacheco-Guffrey, 2019) have been actively used. Specifics including representation, engagement and expression have been addressed. The module representation was quite sound in terms of the module content availability with multiple ways of representation in terms of videos, graphics, and lecture notes. However, the representation aspect needs to be further enhanced in terms of material being usable for text-to-speech software. This will introduce usage and support for more assistive technology in my practice. The engagement aspect, specifically submission type was dictated by university policy. Thus, the current course content specifically for the module (i.e., Back-end Development) does not provide autonomy for engagement. This can be made more flexible in line with the universities polices in future. Further no assessment barriers can be also included to support autonomy for submissions (text video or audio). Apart from that, in the domain of engagement, the student is given multiple ways of interaction with the lecturer to ask questions and feedback about their learning using MS Teams. Finally, in terms of expression students do not have flexible due dates unless they have a learning support plan. However, everything else such as time for assignment submissions, guidelines, goal setting to breakdown assignment in small tasks is sufficient to support student learning. Appendix A and B provide evidence for the LIDA and UDL incorporation in observed practice. Currently these conclusions are drawn from the student sample size of 34 per class, it should be further validated for applicability for larger student sample size.

Considering the mentor's feedback, future enhancement of the observed teaching practice will include educating students on the rhetoric of abiding to attendance policy. More opportunities for open-ended questions and efforts required to increase learner's engagement. Finally based on the student feedback, the addition of more short code explanation videos in the format of bitesize tutorials can be explored.

Tutors implementing SSIL in their teaching practice can also employ the same techniques along with additional bite sized support materials for the learners. Whereas HE organisations will have to enforce richer staff upskilling plans ensuring the implementation readiness. Future work of this observational practice will include the versatile audience including FE, undergraduate, postgraduate and apprenticeship learners. Additon of versatile audience will expand the research to include various aspects such as age (life-long learners, level 3), additional workloads etc. These insights will be instrumental in evaluating the applicability and effectiveness of the proposed framework across a wider spectrum of educational contexts.

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Appendices

A. Assessment Documentation Guidelines incorporating UDL Framework

Evidence 1


Mehak Maqbool Memon

Report Writeup Guideline

Report Expectations

Good Morning Students,

Please make sure your report is composed of following ideas/concepts:

1. Brief Introduction
   - why your portal/website - Whats good as compared to paper-based data keeping.
   - SQL and noSQL mentions
2. ERD + Normalistaion
3. Website Documentation
   - Functionality as User sees it -> the front-end (html+php)
     - Please make sure foreign key fields appear as drop down menu.
   - Logical Functionality - >Php+Sql
     - Please make sure upon insertion/updates/delete data in pupil or parent table junction tables are also populated
4. Testing
   - Mentions in the report
   - Table itself in the appendix
5. Conclusion' +Future Work
6. References
7. Appendices
   - Your Entire Code - Properly commented!
   - Testing Table
   - Your Website Screenshots

Please free free to ask questions if you need more explanations regarding abovementioned aspects of your report. This is the basic expectation if you want to score higher please add more functionalities in terms of tables, more joins etc.

Best of luck.

Mehak

Evidence 2

Assignment Operations:	Entity	Report Structure/Guideline
1. Retrieve	Class Pupil Parent Teacher	• Explain front-end what user sees on the page (html+php) • Explain the logic how it retrieves the data from database(php+sql) • Do it for only one entity and move rest of the entities in the appendix.
2. Add	Class Pupil Parent Teacher	• Explain front-end what user sees on the page (html+php) • Explain the logic how it adds the data from database(php+sql) • Do it for only one entity and move rest of the entities in the appendix.
3. Delete	Class Pupil Parent Teacher	• Explain front-end what user sees on the page (html+php) • Explain the logic how it deletes the data from database(php+sql) • Do it for only one entity and move rest of the entities in the appendix.
4. Update	Class Pupil Parent Teacher	• Explain front-end what user sees on the page (html+php) • Explain the logic how it updates the data from database(php+sql) • Do it for only one entity and move rest of the entities in the appendix.

B. Additional Guidelines for Students with Learning Support Plans

Evidence 3:

UpdateValues.php

C: > Users > mehak > OneDrive - University of Staffordshire > PgCHPE - Mehak > Module 2 Assignment > Miscellaneous > UpdateValues.php

```php
<?php
// -------------------------------------
// Step 1: Connect to the MySQL database
// -------------------------------------
include 'connect.php'; // This file contains the database connection code>

// ----------------------------------------
// Step 2: Check if the form was submitted
// ----------------------------------------
if ($_SERVER["REQUEST_METHOD"] == "POST") {

    // ------------------------------------------------------------------------
    // Step 3: Collect form data and assign it to variables for easy use
    // ------------------------------------------------------------------------

    // Get the ID of the pupil to update (this is the primary key)
    $pupil_id = $_POST['Pupil_ID'];

    // Get the updated values for the fields you want to change
    $class_id = $_POST['Class_ID'];             // New class ID for the pupil
    $first_name = $_POST['First_Name'];         // New first name
    $surname = $_POST['Surname'];               // New surname

    // ------------------------------------------------------------
    // Step 4: Build the SQL UPDATE query to modify the pupil's record
    // ------------------------------------------------------------
    $sql = "UPDATE pupils
            SET Class_ID = '$class_id',
                First_Name = '$first_name',
                Surname = '$surname'
            WHERE Pupil_ID = '$pupil_id'";

    // ------------------------------------------------------------------
    // Step 5: Execute the query and show a success or error message
    // ------------------------------------------------------------------
    if (mysqli_query($conn, $sql)) {
        echo " Pupil record (ID: $pupil_id) updated successfully!";
    } else {
        echo " Error updating record: " . mysqli_error($conn);
    }
```

Figure a: PHP Program with detailed comments providing walkthrough of solution