Development and Preliminary Validation of Learnwise: A Digital Learning Profiling Tool for Assessing University Students' Learning Characteristics and Academic Needs

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ABSTRACT

Academic grades describe students' performance on assessed tasks and provide limited information about how students experience and manage their learning. This study developed and preliminarily evaluated LEARNWISE, a digital tool that converts university students' self-assessment responses into individual learning profiles. The 20-item prototype covers four dimensions: control of learning beliefs, learning motivation, self-regulation, and learning confidence. It presents scores and descriptive categories for each dimension to help students identify perceived strengths and areas for development. Forty university students completed the self-assessment, and the seven-item user evaluation yielded 37 responses. Descriptive statistics were used to summarise the responses. Of the evaluation respondents, 97.3% agreed or strongly agreed that the results were easy to understand, and 89.2% agreed or strongly agreed that the descriptive categories helped them understand their learning characteristics. All 37 agreed or strongly agreed that the tool was useful for identifying areas for improvement. These findings describe students' perceptions of the prototype and suggest that the profile can serve as a starting point for reflection. Further research should examine the reliability and validity of the dimension scores and investigate whether students use their profiles to change their study practices.

Keywords: digital learning profile, student self-assessment, personalised learning support, self-regulated learning, higher education

1.0 INTRODUCTION

University students who earn similar grades may need different forms of learning support. One student may understand the course material but lack confidence in applying it, while another may be motivated to improve but struggle to organise and monitor their study. Grades provide information about academic achievement, while these differences help explain what students may need to progress. Personalised education responds to such differences by adapting learning experiences and support to learners' characteristics and changing needs (Tetzlaff et al., 2021). An initial step towards this goal is to help students recognise the strengths and difficulties they experience in managing their own learning.

Formative assessment provides a rationale for making information about learning available while students can still act on it. Its value lies in how evidence is interpreted and used to inform subsequent learning and teaching decisions (Black & Wiliam, 2009). Feedback can support this process by helping learners understand their current position and consider possible next steps (Hattie & Timperley, 2007). In higher education, digital tools can make information about learning more accessible to students and educators (Ifenthaler & Yau, 2020). For student-facing tools, a practical design question is how to present that information in a form students can understand and use to reflect on their learning.

This study addresses that design question through LEARNWISE, a digital learning profiling tool developed for university students. The prototype uses a 20-item self-assessment covering four dimensions: control of learning

beliefs, learning motivation, self-regulation, and learning confidence. It converts students' responses into scores and descriptive categories for each dimension and presents them in an individual learning profile. The profile helps students identify perceived strengths and areas for development. In the current prototype, personalisation is provided through the profile generated from each student's responses.

1.1 Problem Statement

Academic grades indicate how well university students have met course requirements, but they provide limited information about how students manage their learning. Students with similar grades may differ in their beliefs about whether their efforts can improve learning, their motivation to persist, their ability to regulate their study practices, and their confidence in completing academic tasks. These differences matter when deciding what kind of support a student may need. Personalised education depends on recognising relevant differences among learners and using that information to guide support (Tetzlaff et al., 2021). The problem addressed in this study concerns how information about these learning characteristics is presented to students. A self-assessment can capture students' perceptions across several dimensions, but scores alone offer limited guidance for reflection. For example, a student who reports high motivation alongside difficulties with self-regulation may benefit from seeing both results separately. A single overall score could obscure that pattern. The design challenge is therefore to translate responses into a concise individual profile that helps students recognise their perceived strengths and identify specific areas for development.

LEARNWISE was developed to address this problem by converting responses to a 20-item self-assessment into dimension specific scores and descriptive categories. The resulting profile covers control of learning beliefs, learning motivation, self-regulation, and learning confidence. The value of this approach for student reflection depends on whether students can complete the assessment easily, understand the results, and identify aspects of their learning that may need attention. The present study therefore documents the development of LEARNWISE and provides a preliminary evaluation of these aspects from the students' perspective.

Therefore, this study has two objectives. The first is to describe the development of LEARNWISE, including how the tool translates self-assessment responses into an interpretable learning profile. The second is to examine students' perceptions of the prototype's ease of use, the clarity of its results, and its usefulness for identifying areas for improvement. The study documents the design of a student-facing profiling tool and provides preliminary evidence of how students experience and interpret its output.

2.0 LITERATURE REVIEW

2.1 Personalised Learning Support in Higher Education

University students differ in how they approach academic tasks and, in the support, they need to manage those tasks. Tetzlaff et al. (2021) describe personalised education as a dynamic process in which information about learners informs decisions about instruction and support as their needs change. This perspective provides a rationale for gathering information about how students experience and manage learning alongside evidence of academic achievement. A student's grade indicates performance on an assessment, while information about their study practices, motivation, and confidence can help identify topics for reflection or discussion with an educator.

A student-facing learning profile is one way to present this information. Its purpose in LEARNWISE is to help students interpret their self-assessment responses and identify areas they may wish to develop. Because the profile represents students' perceptions at the time of assessment, it can serve as a starting point for reflection. The current prototype personalises the profile by using each student's responses to generate dimension-specific results.

2.2 Learning Dimensions Underpinning LEARNWISE

The literature on student motivation and self-regulated learning provides a basis for distinguishing the four dimensions represented in LEARNWISE. The *Motivated Strategies for Learning Questionnaire* (MSLQ), for example, distinguishes between college students' motivational beliefs and their use of learning strategies.

Zimmerman's (2002) account of self-regulated learning further explains how students' beliefs, strategies, and reflection interact as they pursue academic goals. Together, these perspectives provide a rationale for examining related aspects of learning separately within an individual profile (Pintrich et al., 1991; Zimmerman, 2002).

Control of learning beliefs concerns the extent to which students believe that their own efforts can influence their learning outcomes. Pintrich et al. (1991) distinguish this belief from students' judgments about their capability to perform a task. In a learning profile, control of learning beliefs captures whether students perceive a connection between what they do and how well they learn. A student may believe that changing their study approach could improve their understanding while still feeling uncertain about their ability to complete a particular assignment. Learning motivation concerns why students engage in academic tasks and what sustains that engagement. Pintrich et al. (1991) distinguish motivational components such as interest in learning, external incentives, and the value students attach to academic tasks. In LEARNWISE, motivation is treated as a broad dimension of students' self-perceptions. Considering it separately from self-regulation allows the profile to represent a student who is motivated to improve yet reports difficulty organising or monitoring their study.

Self-regulation concerns how students plan, monitor, and adjust their learning. Zimmerman (2002) describes self-regulated learning as a cycle involving forethought, performance, and self-reflection. These phases include setting goals, selecting strategies, monitoring progress, and considering how to approach subsequent tasks. In LEARNWISE, the self-regulation dimension provides a way for students to reflect on their reported study practices.

Learning confidence concerns students' perceived capability to handle academic tasks and challenges. It is conceptually related to academic self-efficacy, which the MSLQ treats as a belief about one's capability to learn and perform in a course (Pintrich et al., 1991). Learning confidence is the term used for this dimension in the LEARNWISE prototype. Its inclusion recognises that a student may value a task and believe that effort matters while still feeling unsure about their ability to succeed at it.

The LEARNWISE framework draws conceptually on the distinction between motivational beliefs and learning strategies in the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) and on Zimmerman's (2002) account of how students plan, monitor, and reflect on their learning. Within the framework, control of learning beliefs concerns students' beliefs about whether their efforts influence learning outcomes. Learning motivation concerns their reasons for engaging and persisting in academic tasks. Self-regulation concerns how students plan, monitor, and adjust their study practices. Learning confidence concerns their perceived capability to handle academic tasks. Presenting the four dimensions separately makes it possible to show differences within the same student's profile. For example, a student may believe that effort improves learning while feeling uncertain about completing a particular academic task.

2.3 Digital Self-Assessment and Student-Facing Feedback

The value of a digital self-assessment depends partly on how its results are communicated. Hattie and Timperley (2007) explain that feedback can support learning by helping students understand their current progress in relation to a goal and consider possible next steps. Applied to LEARNWISE, this perspective supports presenting a score with a descriptive interpretation so students can see what it means within each dimension. For example, a student who reports strong learning motivation and greater difficulty with self-regulation can use the profile to identify study planning or progress monitoring as a topic for reflection.

Research on learning analytics also illustrates the importance of evaluating how digital information is used. Heikkinen et al. (2023) found that studies of analytics-based interventions varied in how they supported self-regulated learning and in the outcomes they reported. Although LEARNWISE relies on students' self-reports, this literature raises a relevant question about whether learners can interpret digital feedback and find it useful. For the current prototype, the immediate evaluation priorities are therefore ease of use, clarity of the results, and perceived usefulness for identifying areas for improvement.

2.4 Rationale for the Development of LEARNWISE

The literature provides established concepts and instruments for studying how students approach learning. LEARNWISE addresses a related design question concerning how self-assessment results can be presented directly to students in a concise and interpretable form. Its 20-item assessment generates separate scores and descriptive categories for control of learning beliefs, learning motivation, self-regulation, and learning confidence. Bringing these results together in one profile allows students to see where their responses differ across dimensions and consider where support may be useful. The preliminary evaluation examines how students experience this process and whether they perceive the resulting profile as clear and useful.

3.0 METHODOLOGY

3.1 Study Design

This study involved two components: development of the LEARNWISE prototype and a preliminary quantitative descriptive evaluation. The development component focused on converting students' self-assessment responses into individual learning profiles. The evaluation component examined students' perceptions of the tool's ease of use, the clarity of its questions and results, and its usefulness for identifying areas for improvement.

3.2 Prototype Development and Scoring

LEARNWISE was implemented using Google Forms. The self-assessment comprised 20 items, with five items for each of four dimensions: control of learning beliefs, learning motivation, self-regulation, and learning confidence. Students rated each statement on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

The five item responses within each dimension were averaged to produce a dimension-specific score. Each score was assigned a descriptive category using the thresholds in Table 1. The individual learning profile presented the scores and categories across all four dimensions, allowing students to identify their perceived strengths and areas for development. The score bands were used as interpretive thresholds for the prototype.

Table 1: LEARNWISE score bands and descriptive categories

Mean score	Descriptive category
4.21–5.00	Strength
3.41–4.20	Developed
2.61–3.40	Developing
1.81–2.60	Needs Attention
1.00–1.80	Priority Area

LEARNWISE presents a separate mean score and descriptive category for each learning dimension. For example, in a hypothetical profile, responses of 5, 4, 5, 4, and 4 on the five learning motivation items yield a mean score of 4.40, classified as Strength. Responses of 2, 3, 2, 3, and 2 on the self-regulation items yield a mean score of 2.40, classified as Needs Attention. Displaying both results in the same profile allows the student to see that their reported motivation was stronger than their reported self-regulation. The categories are descriptive labels defined by the prototype's scoring rules.

3.3 Participants and Data Collection

Forty university students voluntarily completed the online LEARNWISE self-assessment. The responses were used to generate individual learning profiles and describe the distribution of scores in the pilot sample. The preliminary user evaluation yielded 37 responses. The two sample sizes are reported according to the instrument completed.

The user evaluation comprised seven items rated on a five-point agreement scale. The items addressed ease of using the tool, ease of completing the self-assessment, clarity of the questions, clarity of the results, helpfulness of the descriptive categories, perceived usefulness for identifying areas for improvement, and willingness to recommend LEARNWISE to other university students.

3.4 Data Analysis

Descriptive statistics were used to summarise both sets of responses. Frequencies and percentages were used to report the distribution of LEARNWISE categories. For the user evaluation, item-level means, and standard deviations were used to summarise the ratings. The proportion of respondents selecting *agree* or *strongly agree* was also used to describe positive responses to individual evaluation items.

3.5 Ethical Considerations

Participation was voluntary. The study procedures were designed to protect participant confidentiality and anonymity, and the findings were reported in aggregate form.

4.0 RESULT AND DISCUSSION

4.1 Distribution of LEARNWISE Profile Categories

Forty university students completed the LEARNWISE self-assessment. Table 2 presents the distribution of overall profile categories reported for the pilot sample. The most frequent category was *Strength*, which accounted for 12 students (30.0%). Ten students (25.0%) were classified as *Developed*, another ten (25.0%) as *Developing*, and eight (20.0%) as *Needs Attention*. No students were classified in the *Priority Area* category.

Table 2: Distribution of overall LEARNWISE profile categories (n = 40)

Profile category	Frequency	Percentage
Strength	12	30.00%
Developed	10	25.00%
Developing	10	25.00%
Needs Attention	8	20.00%
Priority Area	0	0.00%
Total	40	100.00%

The distribution describes how students' self-reported scores fell within the prototype's interpretive bands. The overall category offers a summary, while the four dimension-specific scores provide the detail needed to interpret an individual profile. For example, a student may report strong motivation alongside difficulties with self-regulation. Separate results can help that student identify study planning or progress monitoring as a more specific focus for reflection. This interpretation is consistent with Zimmerman's (2002) account of self-regulated learning, which distinguishes motivational beliefs from the strategies students use to manage their learning.

4.2 Perceived Usability, Clarity, and Usefulness

The preliminary user evaluation yielded 37 responses. Table 3 reports the percentage of respondents who selected *agree* or *strongly agree* for the five items for which these percentages were available. The extended abstract also reported positive mean ratings for ease of use (M = 4.08) and ease of completing the self-assessment (M = 4.03) on the five-point agreement scale.

Table 3: Positive responses to selected LEARNWISE evaluation items (n = 37)

Evaluation item	Agree or Strongly Agree

The questions were easy to understand	91.90%
The results were easy to understand	97.30%
The learning categories helped respondents understand their learning characteristics	89.20%
LEARNWISE was useful for identifying areas for improvement	100.00%
Respondents would recommend LEARNWISE to other university students	100.00%

Nearly all respondents (97.3%) found the results easy to understand, while 89.2% agreed that the categories helped them understand their learning characteristics. The difference points to two aspects of feedback design worth examining separately: whether students can read and understand a result, and whether the category helps them interpret what that result means for their learning. The pilot questionnaire did not establish why responses differed across the two items. Follow-up interviews or open-ended responses could show which category labels or descriptions students found harder to apply to their own experience.

All 37 respondents agreed or strongly agreed that LEARNWISE helped them identify areas for improvement, and all indicated that they would recommend it to other university students. The first finding is particularly relevant to the purpose of the prototype, which is to give students a starting point for reflecting on their learning. Hattie and Timperley (2007) emphasise that feedback can help learners understand their current position and consider where to go next. The LEARNWISE profile addresses the first part of that process by making students' self-assessment results easier to interpret. Whether students then choose and apply a learning strategy remains a question for follow-up evaluation.

4.3 Interpretation and Limitations

The pilot findings support the perceived usability and usefulness of LEARNWISE among the respondents who evaluated it. The small samples and reliance on self-reported responses limit the conclusions that can be drawn about students' learning practices and the wider university population. The category distribution reflects scores generated under the prototype's descriptive thresholds. The absence of students in the *Priority Area* category means that no overall scores fell within the lowest band in this sample. Further evaluation could examine how well the four dimensions are measured and whether students use their profiles to make changes to their study practices. The user evaluation captured students' perceptions of ease of use, clarity, and usefulness. Separate testing is needed to establish whether the system calculates and displays profiles consistently and whether students with different accessibility needs can navigate the assessment and interpret its output. Expert review could examine how well the items represent the intended dimensions and how clearly the category descriptions communicate the meaning of the scores. A subsequent study with a larger and more diverse sample could assess score reliability and validity and examine whether students act on the information in their profiles.

5.0 CONCLUSION

This study developed and preliminarily evaluated LEARNWISE, a digital learning profiling tool for university students. The prototype translates responses to a 20-item self-assessment into an individual profile covering control of learning beliefs, learning motivation, self-regulation, and learning confidence. By presenting scores and descriptive categories for each dimension, LEARNWISE gives students a structured way to reflect on their perceived strengths and identify areas for development. Forty students completed the self-assessment, and the user evaluation yielded 37 responses. Nearly all evaluation respondents (97.3%) agreed or strongly agreed that the results were easy to understand, and all 37 agreed or strongly agreed that LEARNWISE was useful for identifying areas for improvement. These findings suggest that students in the pilot perceived the profile as a useful starting point for reflection. The small pilot sample and reliance on self-reported responses limit the findings to the preliminary evaluation of the prototype.

Future research should evaluate the reliability and validity of the four-dimension scores and examine how students interpret and act on their profiles over time. This evidence could inform the development of targeted learning resources and progress-monitoring features and help determine how LEARNWISE could be used in academic advising and university learning support.

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