Personalised Learning Support at Scale: Development and Implementation of the Mathematics Academic Planner

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Abstract

The Mathematics Academic Planner (MAP) is a diagnostic tool designed to assess students' mathematical assumed knowledge and connect them with support. This paper examines its development, implementation, and comparison with Griffith's GetReady quiz, highlighting engagement challenges and best practices for improving uptake, personalised feedback, and institutional integration of such tools.

Introduction

Over the last several decades, Australian university admissions have moved from strict mathematics prerequisites to broader 'assumed knowledge' requirements (King & Cattlin, 2015). This has brought benefits in the form of widening access and offered more choice, particularly for those who do not have access to higher level mathematics subjects at school. Relaxed entry requirements may be particularly appealing for many in a post-COVID tertiary environment, due to the expansion of online and remote learning and increased appetites for more personalised learning pathways.

However, this shift has introduced challenges. Academic staff, administrators and students often have differing interpretations of the purpose and scope of assumed knowledge (Gordon & Nicholas, 2015; Czaplinksi, Mallet, & Huijser, 2019). When students are unclear about assumed-knowledge expectations, they may make sub-optimal study decisions that influence performance and retention.

Mathematics learning support is widely available at many institutions (MacGillivray 2009) and it is widely acknowledged that engagement with such support can have a positive benefit on student outcomes (Gordon & Nicholas 2012; MacGillivray, 2009; Hillock, Jennings, & Roberts, 2013; Matthews, Croft, Lawson, & Waller, 2013). Despite this, learning support continues to be underutilised across many centres (Mac an Bhaird, Fitzmaurice, Ni Fhloinn, & O'Sullivan, 2013). For many students, accessing learning support early, and often, is a critical factor for success, but reaching and engaging those who need the help remains an ongoing challenge.

To address these challenges, many universities have introduced diagnostic tools, but approaches can vary in terms of timing, design and feedback mechanisms. Such tools can have multiple functions including raising awareness amongst students and staff of assumed knowledge gaps and of support options available and identifying those at-risk. While these functions are not necessarily mutually exclusive, different institutions can emphasise different functions based on their context and priorities.

Across Australia and New Zealand, these 'awareness-raising' tools have appeared in several waves. Early forms include the *Preparing For First Year* competency test at the University of Queensland and the *Ready For First Year* quiz at the University of Auckland; these compulsory quizzes were introduced to first year students upon commencement, tested prior knowledge of mathematics, physics, chemistry and engineering, and upon completion, provided links to resources for review. They were found to be effective at alerting students to gaps in knowledge and motivated users to review areas of weakness (Kavanagh, O'Moore, & Samuelowicz, 2009; Shepherd, Mclennan, Kavanagh, & O'Moore, 2011).

In the next wave, a partnership between five universities built on the above and developed *Get Set for Success,* a quiz aimed at helping incoming first year engineering and applied science students succeed in their transition to university (Wilkes & Burton, 2015). The quiz included both cognitive (mathematics, physics, chemistry, etc.) and non-cognitive (approaches to learning, motivation) questions. The researchers found a “significant correlation between quiz results and academic success in first-year courses” (Johnston et al., 2021), and those who used the feedback were better prepared overall.

More recently, Griffith University piloted *GetReady,* an adaptation of GetSet, in preparation for a removal of prerequisites from their science degrees. Unlike previous 'waves', Griffith's *GetReady* quiz was entirely voluntary and appears to be the first applied within an explicit assumed knowledge admissions environment—that is, an admissions setting where formal prerequisites have been removed but students are explicitly informed of the knowledge expected for success. Despite some limiting factors, investigators deemed the pilot 'effective' and that such quizzes should be 'compulsory' to support commencing students under an assumed knowledge framework (Johnston et al., 2021, p.21). They further suggested that future iterations should incorporate personalised feedback, interactivity, and worked solutions to enhance student engagement and learning. This recommendation aligns with their observations from the literature, which highlight that “mathematics diagnostic testing coupled with feedback enables students to scaffold their knowledge and skills, leading to predictors of academic outcomes”. (Johnston et al., 2021, p.13).

While these 'awareness tools' have been effective in addressing assumed knowledge gaps in STEM fields, similar tools remain lacking across disciplines like economics, commerce, data science, and the social sciences. The Mathematics Academic Planner (MAP) was developed to fill this gap by offering a scalable, institution-wide diagnostic tool that could be adapted to support a broader range of disciplines. In alignment with Johnston et al.'s (2021) findings, MAP builds on this scaffolding approach by delivering personalised recommendations and interactive feedback, integrating both central and faculty-based support services. Unlike previous tools that primarily link students to self-help resources, MAP provides a direct conduit between identified knowledge gaps and targeted academic support. This approach ensures that diagnostic insights translate into actionable guidance and intervention, reinforcing the documented link between feedback, knowledge/skill development, and academic success.

In 2025, The University of Sydney removed mathematics prerequisites from a large number of its science, commerce and economics courses. In addition, a new Student Support policy was implemented in 2024, partly in response to governmental requirements to demonstrate adequate support and timely interventions. These changes necessitated a shift from reactive to proactive student support, prioritising personalised, targeted, and scalable solutions. In preparation, the University decided to pilot a diagnostic 'awareness-raising' tool in 2024.

The *Mathematics Academic Planner* (MAP) was developed by the Learning Hub (the University's centralised learning support unit) in 2023, with the goal of proactively identifying gaps in students' existing mathematical knowledge against the assumed knowledge required to successfully complete specific units of study, and connect them to relevant learning support. The MAP is non-assessable and consists of 30 multiple-choice questions mapped against the assumed knowledge requirements for seven mathematical or quantitative first year units. It provides instantaneous and personalised feedback to students around any knowledge gaps, impacts on subjects and degree progression, and connects them with the most appropriate support programs and resources. The tool draws on design elements similar to the previous list of 'awareness-raising' tools described but includes some additional novel design features.

This paper describes the development and implementation of MAP in a pilot commencing cohort in the first semester of 2024, and provides a comparative analysis with Griffith's GetReady quiz in order to explore effectiveness and implementation challenges, with the aim of striving for best practice in utilising such tools in student support. The paper concludes with recommendations for optimising such tools in similar environments.

Methods

Initiation

At the University of Sydney in mid-2023, concerns emerged that increasing cohort diversity and the University’s proposed removal of mathematics prerequisites could exacerbate mismatches between students’ skills and the knowledge assumed in first-year courses. University-wide surveys of students and staff confirmed this gap, with most respondents supporting the introduction of a diagnostic tool. In response, the University established a dedicated project team—including faculty directors, learning support staff, an educational designer, and a project officer—to develop a centrally administered diagnostic tool for mathematics.

Cohort and unit selection

The pilot cohort was chosen to reflect a diverse range of student backgrounds. Further discussions with stakeholders resulted in the selection of a liberal arts and science degree. This group attracts approximately 500-700 enrolments per year, and is characterised by a broad spectrum of academic backgrounds: students pursue majors ranging from literature and social sciences to quantitative disciplines, and some use the degree as a pathway to engineering or other STEM courses. The degree’s relatively low entry score (ATAR of 70) and lack of mathematics prerequisites further contribute to the diversity of mathematical preparation. Notably, international students typically comprise over 60% of the cohort, and stakeholder observations (from coordinators and learning-support staff) suggest that many students are unfamiliar with the assumed mathematical knowledge required for success in first-year study.

The degree offers 93 majors across science and arts, each with varying mathematical requirements. To ensure broad coverage of assumed knowledge, the team selected seven first-year units with high enrolments, particularly in quantitative disciplines.

These included units focused on analytical thinking, introductory microeconomics, introduction to programming, introduction to data science, a mainstream first-year mathematics unit (covering linear algebra and single variable calculus), mathematics for life sciences, and a foundational introduction to calculus. These were selected based on large enrolments, disciplinary breadth, and high rates of academic challenge, with representations from the pilot cohort comprising between 6% and 100% of enrolments in these units in the previous year. This unit selection reflected both core and elective pathways to accommodate students with widely varying mathematical preparation.

Development and design

For the choice of platform the project team was inspired by the GetSet platform; however, after meeting with the eLIPSe team at UQ and the University's own Educational Innovation team, the project team decided to build MAP using the University of Sydney's Student Relationship Engagement System (SRES) and house it in the University's LMS (Canvas). This allowed a build that would be customisable, student-centric, and could draw data directly from Canvas and other internal University systems. A rapid enhancement of SRES by the Educational Innovation team in implementing a LaTeX plugin enabled input and display of mathematical notation.

The development of the MAP question bank was a multi-stage process designed to ensure alignment with the assumed knowledge required in seven target first-year units. The learning support team, drawing on extensive experience supporting these units, initially mapped assumed mathematical knowledge to weekly topics and intended learning outcomes as outlined in each unit’s syllabus. This mapping process identified the core concepts that were most likely to be barriers to student success.

To further refine the content, peer learning facilitators who had recently completed these units participated in co-design sessions, highlighting concepts and topics students found most challenging, and suggesting sample questions. This collaborative approach was supplemented by insights from bridging course resources and previous diagnostics where available. Item selection prioritised concepts considered essential for success and aimed to minimise extraneous cognitive load, focusing on conceptual and procedural checks. Where possible, items were also informed by established literature on mathematics concept inventories (e.g., Carlson, Oehrtman, & Engelke, 2010; O’Shea, Breen, & Jaworski, 2016), particularly for topics like functions and pre-calculus reasoning.

The question format was inspired by the GetSet style of multiple-choice questions, incorporating response options such as “I don’t remember” and “I’ve never seen this before”. Draft questions were reviewed by unit coordinators and stakeholders, who confirmed the appropriateness and necessity of each item for their respective units, or suggested modifications and additions. Following this, items were trialled with peer facilitators and learning support assistants to provide feedback on user experience, timing, and overall cognitive demand. This iterative consultation ensured face validity and practical alignment with unit expectations. The team recognises that full alignment with learning outcomes will benefit from further formalisation in future iterations, and plans are in place for ongoing validation and refinement using item analysis and frameworks such as those outlined in Akveld & Kinnear (2022) and Rach & Ufer (2020).

The final bank consisted of 30 multiple-choice questions, categorised into Numeracy & Logic, Algebra, Pre-Calculus and Calculus (see Table 1 for a breakdown of topics and item numbers), with each question mapped to the assumed knowledge required for one or more of the target units.

Table 1: Question topics in MAP

Topic area	Topics	Number of questions
Numeracy & Logic	Scientific notation, areas of a shape, average values, basic concepts in probability, solving word problems, logical inference, indexing and nested lists, fractions	8
Algebra	Solving and rearranging equations, algebraic fractions, simplifying expressions with indices, calculate basic trigonometric ratios, radians, simultaneous equations, solving exponential equations	8
Pre-calculus	Logarithms laws, coordinate geometry, solving quadratics, sigma notation, functions as input-output, inverse functions, process and covariational understanding of functions	8
Calculus	Calculating and interpreting derivatives, rules of differentiation, integrating a polynomial, areas of graphs	6

The next step was to establish placement criteria to categorise student performance and identify the levels of support recommendations. After stakeholder consultation, a 60% cutoff was set. Students scoring below this threshold were placed in the ‘Red’ tier, indicating significant knowledge gaps. Those who scored between 60% and 99% were categorised in the “Orange” tier, suggesting partial familiarity, while those who achieved a full score (100%) were placed in the “Green” tier, demonstrating a strong grasp of the assumed knowledge for that unit. This tiered structure provided a clear diagnostic framework for identifying students in need of targeted support.

The determination of these thresholds was informed by practical considerations and close consultation with unit coordinators, who reviewed and endorsed the proposed banding approach for the pilot. The intent was to err on the side of inclusivity - ensuring that even students with modest knowledge gaps would receive support recommendations. To this end, certain “gatekeeper” topics, such as pre-calculus or calculus, were flagged as critical: a Red result in these areas could trigger a Red placement for associated units regardless of the overall average. This initial schema will be reviewed and refined as post-implementation data accumulates, enabling a more evidence-based calibration of placement rules over time.

Upon completion, students receive a Results Page that provided personalised feedback and advice. The recommendations and advice here were developed in consultation with unit coordinators and faculty experts to ensure alignment with course expectations and available support resources.

The feedback was structured across three key components. The first is a heat map displaying their performance in each of the four topic areas, with support and resource recommendations to review or strengthen those areas (see Figure 1). The second is a heat map of all seven units, where students’ placement within the tiered system (Red, Yellow, or Green) determined the level of support recommended. Students in the Red tier receive the most detailed and extensive recommendations to address significant gaps, while those in the Yellow and Green tiers receive progressively lighter guidance. See Table 2 for a generic example of the tiered recommendations.

The final component of the Results Page was a matrix displaying each question alongside the unit(s) for which it was classified as assumed knowledge, and whether their response for that question was correct. This provides students with a transparent and detailed breakdown of how their responses aligned with the expectations of specific units. Additionally, upon completion, students received an automated email summary of their results, including direct links to book follow-up consultations with learning advisors to discuss their performance and plan next steps. The email also contained an invitation to complete a survey on their experience and perceptions of the tool.

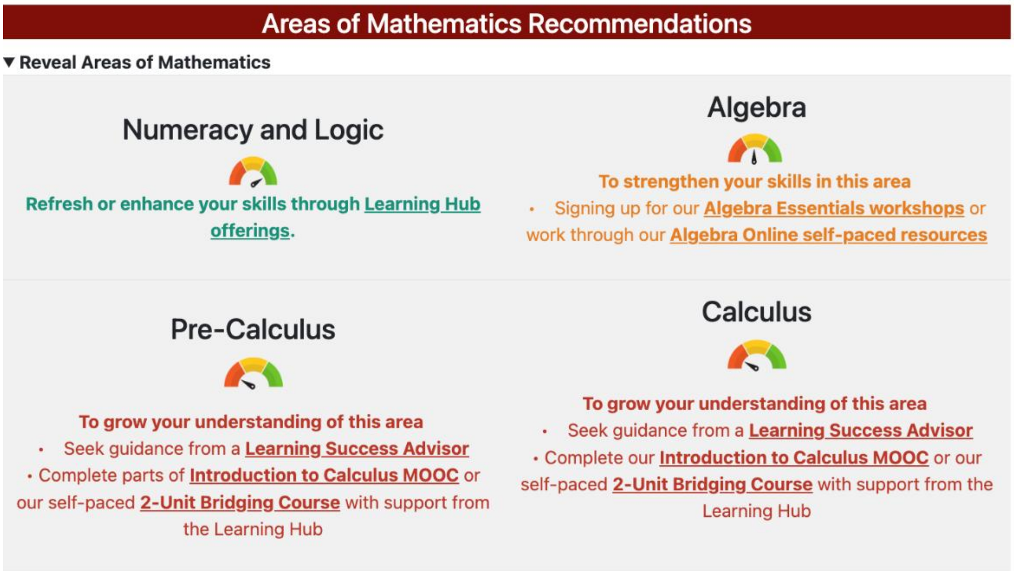

Figure 1: MAP heat map display of mathematics topics results

Table 2: Representative example of tiered support recommendations

Green	You are likely prepared for this unit. Consult with an advisor for any additional assumed knowledge requirements. Enhance your learning by attending supplementary tutorials or using Learning Hub resources.
Orange	Your learning experience in this unit may be impacted; some preparation is advised. Before semester • Review key areas for improvement • If you have not studied HSC Mathematics Advanced, consider enrolling in a foundational course or preparatory online module During semester • Attend weekly supplementary tutorials or peer assisted study sessions • Use Learning Hub support services
Red	Your learning experience in this unit will be adversely impacted without additional support. Before semester • Review your degree plan and seek academic advice • Consider enrolling in a foundational mathematics course or completing a preparatory online module During semester • Attend weekly supplementary tutorials or peer assisted study sessions • Regularly seek help from Learning Hub support services • Schedule check-ins with a Learning Advisor

Implementation and rollout

Before semester began, MAP was fully integrated into the LMS and was ready to be rolled out in Week 1. The team partnered with program directors and first-year coordinators to introduce the tool during week 1 lectures of a compulsory core unit in the degree. Since students in this cohort are required to prepare and submit their degree plans the following week, the presentation framed MAP as one of the tools to assist in their degree planning and preparation, and walked them through its functionality. This framing was important, as program directors expressed concern it could inadvertently suggest a mathematics requirement for their degree.

By week 1, the diagnostic was live, and students were prompted to take the MAP during the first two weeks of the semester. To maximise participation, coordinators sent regular reminders and announcements, and incomplete attempts triggered automated emails prompting them to finish the diagnostic.

Discussion

Stakeholder feedback from program coordinators, faculty, and project team members highlighted four key themes regarding the implementation and impact of MAP. First, while the tool achieved substantial reach—approximately half the student cohort accessed the MAP site—stakeholders repeatedly observed that those most in need of support were least likely to see or engage with the tool, due to missing links or not attending the relevant tutorials. This points to an ongoing challenge in targeting interventions to at-risk students. Second, the importance of communicating the value of MAP to students was a recurring theme, particularly for non-STEM majors such as Economics. Project team members noted that students in these disciplines may not readily perceive the relevance of mathematical readiness, underscoring the need for targeted messaging and engagement strategies. Third, practical aspects of tool placement and user experience were identified as priorities for future iterations. Suggestions included making the MAP link more prominent within Canvas and clarifying the presentation of feedback, for example by refining the interpretation of heat maps and tiered advice indicators. Finally, the process of developing and implementing MAP fostered greater curriculum transparency. Engagement with the tool prompted some unit coordinators to reconsider which mathematical concepts and skills were truly assumed in their courses, revealing that even faculty may not always be fully aware of implicit expectations.

In addition to qualitative feedback from program coordinators and staff, operational data from the pilot provides further context on MAP's reach and student engagement. By the end of semester, nearly half of the pilot cohort had accessed the MAP site, indicating substantial awareness of the tool. About 15% of the cohort attempted the diagnostic, and most completed it in full. Of these, almost half subsequently accessed additional learning support services (about 5% of the total cohort). These descriptive figures suggest that MAP facilitated access to support services for a substantial proportion of participating students. Furthermore, as part of standard quality assurance reporting, preliminary analysis of cohort-level data suggested that students who engaged with the diagnostic tool were more likely to complete their units successfully compared to those who did not. However, no formal research analyses have been conducted to date; further evaluation is planned pending appropriate ethics approval.

Table 3 provides a comparative analysis of the features and rollout of MAP with Griffith's GetReady Quiz. The information for GetReady was drawn from Johnston, Loughlin, Brown, Williams, and Watters (2019) and Johnson et al. (2021).The table highlights key similarities and differences between MAP and GetReady. Both tools shared the common purpose of assessing students' background knowledge against the assumed knowledge of their courses, raising awareness, and encouraging early action. Each was delivered through an LMS, was non-compulsory, and provided some form of post-quiz feedback to students.

Table 3: Comparative Analysis of MAP and GetReady Quiz

	MAP (USYD)	**GetReady Quiz (Griffith)**
Purpose	Help students assess their background knowledge against assumed knowledge for first-year units. Provides personalized, actionable advice and resources.	Help students receive timely feedback on their knowledge and skills compared to general expectations for assumed knowledge.
Pilot Cohort & Implementation	• First-year, first-semester core unit in a Bachelor of Liberal Arts and Science degree. • Cohort size: approx. 500-700 students. • Non-compulsory and untimed. • Framed as tool to support degree planning.	• First-year, second-semester Chemistry unit. • Cohort size: approx. 250-300 students. • Non-compulsory and untimed.
Delivery Mode/Platform	LMS-independent (Canvas), delivered via SRES. Cohort was enrolled directly into the MAP LMS.	Integrated within the Blackboard LMS of the unit.
Question Design	30 multiple-choice questions covering assumed knowledge in seven first-year units: • 8 Numeracy & Logic • 8 Algebra • 8 Pre-Calculus • 8 Calculus	45 multiple-choice questions, benchmarked against Year 12 subjects, covering: • 5 x Numeracy • 20 x Mathematics • 10 x Biology • 10 x Chemistry
Post-Quiz Features	• Automated results page with heat maps indicating strengths and weaknesses. • Tiered recommendations (Green, Yellow, Red) with suggested support resources. • Summary of correct/incorrect answers. • Summary emailed to students with links to learning advisors for follow-up, along with invitation to complete a feedback questionnaire on their experience with the tool	• Summary of correct/incorrect answers provided. • PDF with links to online resources for further revision. • Post-quiz questionnaire on students' perceptions of the tool and prior experience.
Institutional Uptake	Approx. 15% attempted the quiz	Approx. 11% attempted the quiz

However, clear differences also emerge in their scope, design, and institutional integration. While GetReady was tailored to a single first-year chemistry unit and benchmarked against Year 12 subject knowledge, MAP was designed for institution-wide scalability, assessing assumed knowledge across multiple first-year units spanning different disciplines including non-STEM fields. Additionally, GetReady provided students with summary feedback and links to online resources, whereas the latter incorporated tiered personalised recommendations and direct integration with university support services, offering a more streamlined pathway from diagnostic insights to targeted academic intervention.

A key distinction of MAP is the application beyond traditional STEM disciplines, extending its use into fields such as economics. A benefit of this expansion is the tool's ability to support a broader range of students, many of whom may not initially recognise the mathematical demands of their coursework (Trott & Chinn, 2016, as cited in Trott, 2018). Through embedding assumed knowledge diagnostics into a degree planning context, MAP aimed to bridge this awareness gap and provide students with clear, discipline-specific recommendations.

However, MAP's broader applicability also introduces engagement challenges. Uncertainty about MAP's value could lead to a hesitation to engage, as some students may struggle to see its relevance. Post-implementation reviews also highlighted mathematics anxiety as a potential barrier to participation, particularly among non-STEM students. Beyond cognitive barriers, logistical factors such as time constraints and the tool's voluntary nature likely played a role in the low levels of engagement.

Similar challenges were observed in GetReady, where only 11% of students participated, comparable to MAP's 15% uptake. Both tools were non-compulsory, limiting their reach among students who might be most at risk. Additionally, low engagement restricts the ability to refine the tool due to insufficient data. Feedback from program coordinators, while anecdotal, suggested that those most in need of support were also less likely to attend the lectures or tutorials where MAP was introduced, further reducing its impact. Johnston et al. (2021) noted similar concerns and recommended making such tools compulsory to ensure broader engagement. While MAP attempted to mitigate these challenges through its integration into degree planning and tailored feedback structure, further refinements such as integration into tutorials or offering incentives for completion, could help drive participation. Additionally, clearer communication strategies could reinforce the tool's value to students and encourage engagement for all students regardless of mathematical background.

Relatedly, timing and access emerged as important contextual factors. MAP was introduced in Week 1 during the first lecture's degree-planning component (with degree plans due at the end of Week 2), whereas GetReady was available for three weeks in the final third of semester via the LMS (Johnston et al., 2021). Stakeholders indicated that earlier exposure could provide more lead time for action (e.g., enrolment adjustments, revision, advice-seeking), but also noted that pre-semester deployment can be constrained by institutional policies and enrolment-dependent LMS access. Accordingly, a dual-timing approach could be considered: providing pre-semester exposure where feasible, while retaining Week 1 integration to reach students who enrol late and align with degree-planning activities.

Another novel feature of MAP was its underlying quiz engine. While both GetReady and MAP were delivered via an LMS, the latter was built using SRES, which provided enhanced flexibility compared to traditional LMS-based quizzes. SRES not only replicated much of the functionality of the GetSet platform, it also allowed for greater customisation, including integration with existing university systems and automated feedback mechanisms. Another key advantage of SRES is its scalability, enabling MAP to be expanded beyond its pilot cohort. The platform also supports customisable result displays, allowing future adaptations to align with different faculty needs. Given these benefits, future work could explore how SRES can be leveraged to develop discipline-specific versions of MAP or create a centralised diagnostic hub for assumed knowledge across multiple subject areas, enhancing institutional coordination of learning support.

In terms of post-quiz results, while both tools provided some form of feedback and communication, Johnston et al. (2021) identified personalised feedback and worked solutions as critical areas for improvement in future iterations of GetReady. MAP addresses this by presenting tailored feedback through a tiered structure with heat maps as a key design element. It was felt that tables using ticks and crosses may be intimidating and demotivating for some students, and the heat map approach was considered a clear and engaging way to visualise performance, making it easier for students to identify strengths and areas for improvement. While the traffic light system was chosen for its clarity, we recognised that being classified as 'red' could affect student confidence. Recommendations were therefore framed in a supportive, non-judgmental manner, and future iterations may explore alternative visual cues to further minimise unintended negative effects. Additionally, rather than providing links to individual questions, MAP integrated faculty and centralised support directly into the results page. These novel features allowed MAP to seamlessly integrate personalised support recommendations based on their quiz outcomes, ensuring students are not just made aware of their knowledge gaps but are guided towards the appropriate institutional resources to support their learning journey.

Based on the analysis and reflections above, some recommendations and suggestions for best practice emerge for implementing awareness type tools similar to MAP and GetReady:

- **A communication strategy should be developed** that takes into account both the subject area and the diversity of the target cohort. Considerations should be given to how to help students understand the value in using the tool and its impact on their success in their studies. The supportive and formative nature of the tool should be emphasised to reassure students and mitigate fears or reluctance to engage due to uncertainty or mathematics anxiety. The strategy should also incorporate methods to engage disengaged students who may not proactively seek academic support; this includes alternative modes of outreach such as embedding the tool into pre-semester activities.
- **Placement and location of the tool should be optimised** to ensure a high visibility and wide accessibility. Possible locations include high traffic areas such as unit homepages or student dashboards.
- **Compulsory participation should be seriously considered** to improve impact and to generate sufficient data for tool improvement. The opt-in approach may not effectively reach and engage a large enough proportion of the targeted cohort, particularly those most likely to be disengaged.
- **Personalised feedback should be incorporated** in some form, ideally with tailored recommendations for resources and support, and opportunities to take action. Worked solutions, as Johnston et al. (2019) suggests, could also be considered.
- **Mechanisms for tracking student action post-quiz should be incorporated or improved.** While engagement with support services was tracked for users of MAP, attributing specific improvements directly to the tool remained a challenge in the pilot phase. A more structured approach could provide clearer insights into student progress and inform future improvements to the tool.

Conclusion

This paper has outlined the development, implementation, and analysis of the Mathematics Academic Planner (MAP), an "awareness raising" diagnostic tool designed to support students in an assumed knowledge admissions framework. Through a comparison with Griffith's

GetReady Quiz the paper identified some common challenges and opportunities in the design and provision of such tools.

Both tools provided personalised feedback and support recommendations, but student engagement remained a key challenge, especially among students needing the most support. The voluntary nature of these tools may have contributed to low participation rates, highlighting the need for stronger integration into the student experience. Additionally, stakeholder feedback suggested that disciplinary framing and perceived relevance may affect uptake; mathematics anxiety and uncertainty about the tool's usefulness could also deter participation, particularly among non-STEM students.

Moving forward, institutions seeking to implement similar tools should consider:

- Exploring a compulsory or strongly encouraged model to improve uptake.
- Developing targeted communication strategies to increase student awareness and engagement.
- Enhancing personalised feedback and providing clear pathways to follow-up support.
- Optimising diagnostic placement within the student journey (for example, orientation, enrolment advising, unit homepages).

MAP has demonstrated its potential as an awareness-raising and support tool, offering personalised feedback and a structured pathway from diagnostic insights to academic support. However, the challenges of voluntary participation and engagement highlight the importance of embedding such tools more deeply into the student experience. To ensure such tools reach those most in need of support, future iterations will refine engagement strategies, expand the tool's reach to broader disciplines, and explore integration into a wider institutional support framework (such as embedding into orientation modules or advisory sessions).

As assumed knowledge models become more prevalent, scalable tools such as MAP can play a crucial role in bridging knowledge gaps, fostering early intervention, and supporting students at scale.

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