Encouraging Student Academic Performance Using Automated Academic Advising System: A Reflection

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Abstract

Automated academic advising, as an innovative student support tool, might encourage students' mediation of their academic and advising support in a learning platform. In our pilot project, conducted in one school at a university in South Africa, we sought to understand the factors that enhanced cum-laude and suma-cum-laude trajectory students' success. AutoScholar Advisor System was used to encourage the students' performance. The preliminary results prompted our scaling up to involve whole programmes and all students in two schools of the university. In this paper, we share our reflections thus far and highlight some key insights.

Keywords: student performance, automated academic advising, student success, academic support, higher education, technology-enhanced learning

Introduction and Background

Undergraduate students are expected to embrace university norms and culture, feel a sense of belonging, engage, and flourish in ways that result in persistence and completion [1]. However, merely persisting and completing a degree may not sufficiently lead to the valuable expected success outcomes, for example, in South Africa's higher education context. This is even more of a concern when the student performs poorly without achieving the required skills [2]. For the university student, high performance could be normalised as a strategy to achieve success, which implies graduating with a desirable class degree with corresponding skill sets. Opposed to the objective of merely passing and degree completion, such conceptualisation should aim at nudging students to perform at their full potential. Supporting the student to perform at full potential is important because student success must yield expected values in measurable outcomes both for students and for the institution [3]. However, whilst there is no 'wonder working' key to student success, the challenges of success in university are complex, contextual, and nuanced [4]. Hence, it is important to

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create an enabling academic advising and support environment for student success in university [5].

Reflecting on the implications of our project findings thus far, this paper, in the first part, focuses on conceptualising academic advising and support for enhancing students' performance at full potential. In doing so, it unravels issues pertinent to success in university [6], particularly as problematised with the realities that are evident in the South African university context. The second part discusses why automated academic advising is important and timely. Next, it presents our reflection on the different stages of the project conceptualisation, planning, and implementation and moves on to discuss the students' perspectives on their high performance and success and the learnings from the project. The last part of the paper examines the prospects and challenges of automated academic advising considering pertinent issues of digital equity and student support for success in the South African context.

Context and Problem

In South Africa, the rate of student attrition in universities continues to be high [7] and improving student success rates is a challenge for many institutions [8]. Globally, the literature suggests that undergraduate student outcomes are not meeting the expectations of universities [9], and many students struggle to cope with their studies post-COVID-19 [10]. However, the majority of the student body in South African universities are from backgrounds of historical disadvantage [11] that shaped their prior university experiences. Many also are first-generation university students [12]. For many of these, while the in-university experiences can be harrowing [13] other factors that students consider as important to their performance must be explored to meaningfully support them to succeed. Hence there is a need to know what helped those who are academically high-performing to succeed regardless of the challenges students are up against in the universities.

Students' academic advising and support in South African universities and the changing landscape of higher education

Universities in South Africa invest in support programmes to improve student experiences and enhance their success [14]. However, the support that is provided tends to be exclusive and is perceived by some students as hardly

matching their needs and expectations [15] Student success discourses seem to be minimalised as just persistence and degree completion. Yet, some students in university could be completely underprepared in terms of knowledge [16]. Innovative and suitable student academic support could, therefore, be central to creating the kind of environment that enhances students' high performance, which in turn improves their class of graduation. Student support must also increase the prospects of valuable success outcomes in universities.

The changing landscape of higher education globally and the increasing adoption of technology in all its spheres [17] means that a strategy for enhancing students' success in university must be adapted. Hence, South African universities must draw on and leverage technology to mediate student support. [18] suggest that there is increasingly a need to adapt student academic support to technology-enabled learning environments. The necessity to adopt technology and info analytics data in deriving evidence that interrogates and informs how students are supported in their learning [19] can no longer be ignored by universities.

Academic advising is one area of student support in universities that is known to have a high impact [20] on student success. Academic advising can also be developed to underpin strategies for nudging and encouraging students' high performance. In this way, it can contribute to their optimizing class of degree graduation with which they complete their studies. However, in South Africa, implementing successful academic advising for undergraduate students would require addressing holistically the complexities of the issues that they considered important for their success in the universities.

Issues such as focused support for student equity [21] supportive feedback [22], development of learning skills, guidance with career choices [23] resilience [24] counselling for wellbeing [25] improving digital literacy and use of technology in learning [26,27] and more, meld to form the nature of the South African student's academic development and support needs. However, technology can be mediated to underpin the student advisement and ensure the students' academic advising and support needs are effectively targeted and met [28]. In addition, it can be applied to ensure that the student's support needs are met in

a way that results in desirable outcomes. Automated academic advising [18, 29] could be a highly useful strategy for supporting student academic performance. In this way, it could promote the student's development of knowledge and important skills, thereby boosting prospects of valuable expected success outcomes in university.

The cum laude students' success enhancement project

Project Background

The project started as a pilot in the School of Education with a cohort of estimated 1000 students identified to be potential cum laude and summa cum laude students in the Bachelor of Education (B.Ed.) programme. This cohort was drawn from the undergraduate population of about 6000 students across all levels of the four-year programme from the first to fourth year. However, first-year students' tracking only commenced after their first-semester performance met the set criteria for identification to be cum laude and summa cum laude trajectory using the Auto-Ad.

Project Scope

Initially, to be manageable as a pilot, the project was limited to the use and application of the Auto-Ad for the participating student cohort in their specific registered modules in the B.Ed. programme. It was carried out in the school for the 2022 academic session. In 2023, the project is currently being scaled up to include all students in two schools and for modules offered in the two programmes of the selected schools – the School of Chemical Engineering and the School of Education. In addition, institutional usage, and the efficacy of the Auto-Ad as a student performance tracking and support tool by selected lecturers and academic support advisors in both schools are being investigated.

Purpose of the Project

Understanding the factors that influence student success with the university was a concern for the university. In line with this concern, the purpose of our project was to 1. understand cum laude and summa cum laude trajectory students' academic high performance and success experiences. 2. draw on such experiences to model academic advising support intervention that boosts undergraduate students' high performance and completion. 3. support increases

in the number of those graduating with a higher class of degrees with matching skills from the university.

What motivated the project

Nationally, the low performance and low throughput rates of higher education students are worrying [30]. Hence, research interests in understanding the factors that influence student success at the undergraduate level in universities in South Africa [31]. However, institutional and research focus is on students' underperformance [32]. Students' weaknesses informed by deficit discourses and factors that put the student at 'risk' pervade the student success debate. In contrast, the success experiences and factors that influence high performance by those students who are highly performing often escape the radar and, as such, are almost unknown. Likewise, persistence, retention, and completion are widely researched topics [33]. Yet, in the South African university context, there is little attention given to understanding the success experiences of high-performing students albeit knowledge of such could inform strategies for persistence, retention, and successful completion.

Accordingly, a gap exists in knowledge of what supports the high-performing students' motivation and academic success. This gap is a problem, at least in South African higher education. In particular, it is disturbing if viewed against the historical backdrop of student academic development practices and the reimagined academic support needs of the majority of students in its universities [34]. To explore and enhance factors that enable academically performing students' performance at 'full potential' should therefore form part of projects to problematise and understand what factors influence student success with the university.

What we did in the project

In our project, we adopted a conceptual approach drawing on students' self-authorship [35] to explore cum laude and summa cum laude trajectory students' academic high performance and success experiences. We sought to understand better and to inform how the students engage in a self-mediated automated academic advising support environment on the university's Learn22 learning management platform. In doing this, the project utilized student the self-authoring concept in examining patterns of the students' agency in interacting

with the automated academic advising system. We further explored the students' experiences by eliciting their perspectives on their high performance and agency in terms of their behavioral mindset, traits, and network of support as well as skills that enabled them to succeed. In the process, we gathered important information and feedback, the data needed to crystallize our understanding of the students' academic support needs for high performance. Therefore, this data enabled us to better inform our knowledge of their influencing success factors. Knowing the influencing success factors was useful to continuing input to designing the automated academic advising system to effectively target the students' support needs.

But beyond that, the data were crucial to designing the automated support to nudge and motivate the students to optimize their performance at full potential [18]. A potentially typical added value of the project was Auto-Ad's propensity for identifying those modules that posed the most challenge to students. 'Improve your results'(see Figure 1 below) was a tailor-made solution designed to aid the student to self-motivate and take important decisions and necessary steps needed to initiate and enable support to improve and achieve desirable results.

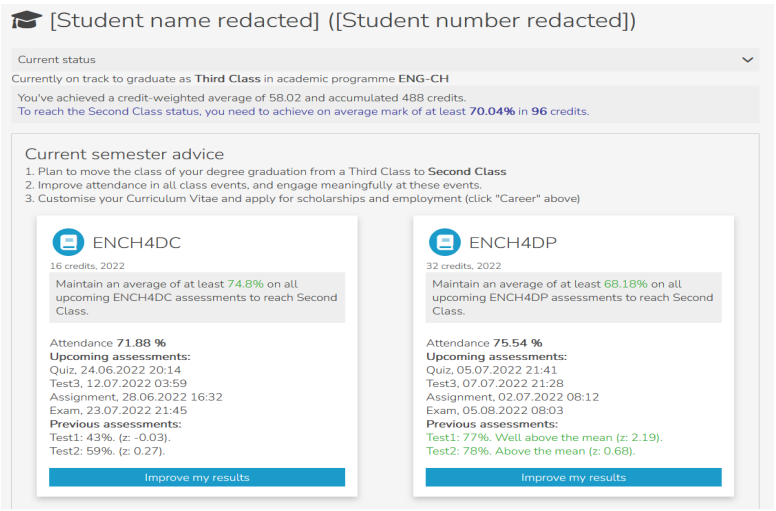

Figure 1: AutoScholar Advisor System's Student View

Why the Automated academic advising

The onset of the COVID-19 pandemic adds another layer of challenge [36] to promoting student success in South African universities. It is not yet clear how these were addressed to mitigate structural barriers that the pandemic

exacerbated [37]. However, it is certain that the swift shift to online and hybrid learning modes tended to marginalize several students [38] thereby compounding the student success predicament in the universities. However, opportunities are created to explore how students can be better supported by leveraging the shift. [39] argues for the importance of commensurate and equitable support that is appropriate to match access opportunities granted to the majority student population in South African universities. However, support for students needs to be transformative enough and mediated in ways that are helpful and adequate to enhance the student's chances of success [40] in the universities. Accordingly, whilst the challenges to student success in universities are complex and daunting [41], well-thought-out solutions must recognize the central role the student plays. It must identify and harness the student's strengths and encourage their development of active agencies [42]. It must create for the student options and choices to shape their own success outcomes.

As new pedagogies emerge post-COVID-19 pandemic, it becomes important to recognize how self-authorship [43] is a key path towards which students' agency must be enabled. With the increasing application of online pedagogy, it is only a matter of time to realize that technology-enabled academic advising and support to students in South African universities is necessary. Students are not to feel like fish out of water because they simply cannot activate their agency to utilize technology and make decisions or have a voice in their learning.

Reflections

1. Project conceptualisation

The catalyst for this paper was the pilot project that started in 2022, however, the conceptualisation of the project began in 2017. Two of the authors of this paper conceptualised a different but complementary proactive approach to the structured academic support provided for students in the School of Education, which they deemed as exclusionary and reactive in nature. Hence, considering the challenge of supporting underperforming students to take a more proactive role in their learning using the existing approach, a case was made for reimagining the success discourse [18]. We emphasized the core role the student plays as the most important stakeholder in their own success in university.

Hence the consideration that student success may be problematic when viewed as a destination of disjointed journeys in the student life instead of the student experience of 'being' and 'doing'. Thus, a need to enable a flipped approach to structured academic support was muted. Shifting it from the reactive focus on remedying students' weaknesses and underperformance to proactive academic support that recognizes the critical role of students' active agency [42], and the importance of leveraging their strength and potential for high performance.

In 2022, further discussions and exchange of collaborative ideas and insights led to the formalization of the project titled "Student Academic Success: Enhancing potential cum laude and summa cum laude students' self-authorship." The project was proposed to, and subsequently linked as part of the University Capacity Development (UCDP) and the university's teaching and learning Access and Support Advisory Forum (ASAF) student support project. It is currently a sub-project of the main university project.

2. Project planning and implementation

In planning and implementing the project, we carefully considered the design. Deciding on self-authorship [35], as the girding theoretical orientation for understanding and interpreting the students' experiences, we employed a mixed methods research approach to investigate their high performance and success. We aligned the automated academic advising to underpin and promote self-authoring abilities that the students' perspectives on their experiences highlighted.

In the initial pilot of the project, we intended to learn, for example, how the Auto-Ad will aid in understanding students' performance trajectories. How does it enable them to take greater responsibility in piloting their own performance? We were keen also to understand how it enables the students to learn to lean on their own self-regulation whilst mediating support to boost performance. We strongly anticipated learning what the cum laude and summa cum laude students are doing differently.

The research implementation stage was thorough. Research ethics guides the researcher and the research processes and protects the interests of the research participants. Therefore, at the outset, the project research application for ethical

approval was reviewed and approved by the university's ethics committee. Several methods comprising both quantitative and qualitative methods were utilized to generate the data [43].The use of a mixed methods approach and the triangulation of data collected with both methods provided an encompassing grasp of complexities and nuances of the students' perspectives and their perceptions of the experiences shaping their high performance and success. It was also useful for addressing the validity and reliability [44] of quantitative insight into the factors influencing the students' performance.

Working with mixed methods proved useful for the project research purpose [45]. We started with a trial survey questionnaire to generate quantitative data, which was then analysed using statistical software [46]. Next, the team evaluated and refined the survey questionnaire to include or exclude omitted or unrequired themes. Themes were guided by the intended project objectives from which the research questions were drawn. Armed with refined instruments, online invitations were then sent to 842 participants that were eventually identified as cum laude and cuma cum laude trajectory students in the B.Ed. programme using the criteria set with the Auto-Ad. The quantitative research was followed by focus group and individual interviews and document analysis to generate the rich qualitative data [47] Practical considerations were given to designing the qualitative research [48] in order to address the 'how' and 'why' research questions and enable a deep understanding of the students' experiences.

Quantitative data were analysed with the Auto-Ad Pollster analysis feature to correlate the student performance data (student average pass rate, mean) with questionnaire responses. Pearson R coefficient value, where the R-value was calculated between the Extent of Agreement for a given statement and the student Credit Weighted Average (CRW) was applied. A value closer to 1 or -1 indicates a relatively high correlation between the agreement with a statement and student performance. Qualitative comments were analysed using thematic analysis [49], which allowed in-depth insight into the students' perceptions of their performance.

3. Students' perspectives of their high performance and success

The students considered knowledge, self, and relationships to be most important for achieving high performance and success [18]. Furthermore, the strongest correlated factors were choice of degree, motivation, study habits, family, and relationships[18]. These findings so far align with the expected project outcome, which is to find ways of supporting students from their position of strength as opposed to fixation with risk. However, even with such efforts to improve high academic performance, challenges associated with student success in universities would still exist in South Africa. This is because the students come from multi-faceted social, economic, and cultural backgrounds that replicate in their experiences of access to opportunities in the universities. Left unaddressed, this tended to produce their different learning experiences [50].

Likewise, the student's experiences of high performance and success, as the findings suggested, are influenced not only by factors within their immediate learning environment in university but also influences from outside, like family and relationships [18], as examples. Therefore, supporting students to develop self-authorship involves considering all factors that influence how they construct their own self-belief and relationships with others and the important decisions regarding their learning.

4. Learning from the project for expanded scope

The three key learnings from the project thus far include, firstly, the student is at the centre of their success in university. However, the student's success is influenced by the environment (microsystem, mesosystem, exosystem, and macrosystem) and attributed to factors they consider important to their learning. There is therefore a need to expand the projects' prism on the students' performance and success to broadly include all that matters to the students from their perspectives as most important for achieving high performance and success. Hence the project expanded its theoretical framework to also espouse the ecosystemic theory [51] in order to better explore the different spheres of influence on the students' performance and success, which are not simply determined by their self-mediation of the learning experiences. These influences may consist of supportive lecturers and advisors, structures that impact the learning environment, accessibility to resources, including learning support

tools, positive relationships with peers, and their network of support as some examples. In understanding the loop of the interdependence of these factors and their relationships with student academic performance and success outcomes, as illustrated in Figure 2 below, we reasoned that the ecosystemic perspective was crucial to the context of academic support in the university and for encouraging the students' self-authorship development.

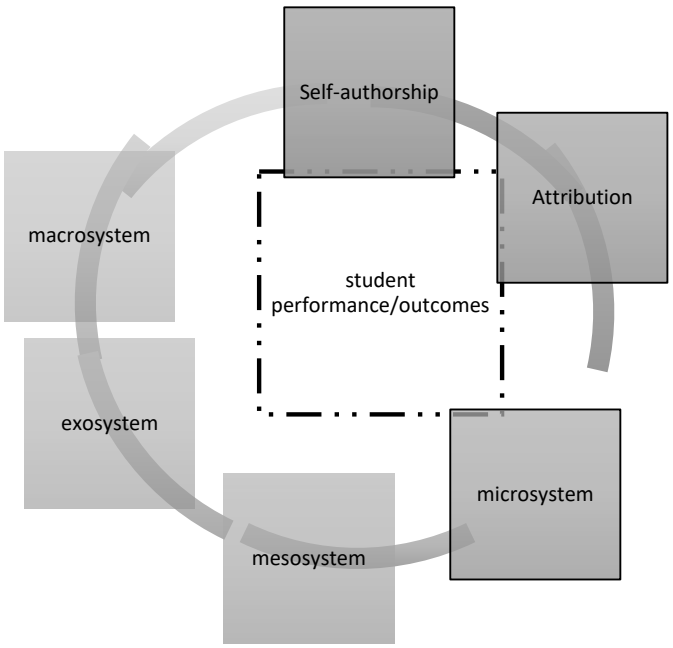

Figure 2: A loop of factors and relationships with student academic performance and success outcomes

Likewise, attribution theory [52] allows for understanding how students make sense of their settings, perceive, and assign reasons for their own actions or those of others as they enact self-authorship. It is important to use attribution to understand the students' mindsets regarding where and how influences are attributed to as encouraging or setbacks in their performance and success. This will allow us to understand how the students attributed meanings to the materiality of their lived realities in their learning; particularly in terms of

performance and success experiences influenced by relationships with peers, lecturers, and the ways the curriculum is mediated.

Secondly, together, these three theoretical perspectives provide a broader lens to the students' perspectives on their high performance and success in the university. They offer a more meaningful insight into the student's perceptions of their success experiences. Hence, armed with a broadened framework, firstly, the project expands understanding of the importance of the students' self-authoring abilities to forge their own identity and take charge of their learning and success (self-authorship), for example whereby the student takes charge to mediate their academic and advising support on the learning platform. Secondly, the project explores the mental processes involved in the students' attribution of the positive or negative influences on their success (attribution theory), for example whereby the student makes decisions and takes important steps to achieve a positive outcome. Thirdly, the project examines how the larger ecosystem affects the student's performance and success (ecosystemic thinking), for example, the student and relationships with peers, friends, and family.

Lastly, using insights drawn from the findings of the research, we identified possibilities of extending the project to include students who had missed the opportunity for cum laude or summa cum laude status. So, we redesigned an extended project to look at enhancing the potential of the students to perform at their full potential, which could then be either first class, upper second class, or other levels of optimal performance in each case. Hence the project evolved to support students at programme levels in the two schools mentioned above. We then aimed to:

- advance more robust evidence for undergraduate students' automated academic advising and support university-wide.
- develop a model to improve student self-regulatory behaviours and development of skills for high performance and success in the university.

Prospects and challenges of Automated academic advising in South African university context

Student success is defined as "academic achievement, engagement in educationally purposeful activities, satisfaction, acquisition of desired knowledge, skills and competencies, persistence, attainment of educational outcomes, and post-university performance" [53] In line with this notion of student success, innovative learning practices, tools, and support interventions that encourage high academic performance among students in university must be extended to support all students to have equal opportunity if they are to succeed in university.

According to [54], massification of higher education raises new challenges concerning success in a university. Again, the many challenges to success in university suggest that student success is a complex matter that requires a multi-layered approach [55,56]. For instance, interventions to support student success might consider the students' backgrounds in order to promote individual strength and success. We considered such backgrounds as crucial elements in designing and implementing automated academic advising support because success could depend on incentives to motivate the individual student's ability to navigate their learning.

Furthermore, the institution in which students study has a major role to play in supporting their academic high performance [57, 58]. As such, the student's high academic performance and success are influenced by the institutional teaching and learning environment, whether the environment is online, face-to-face, or hyflex [59, 60]. Research [60, 61] shows that during the COVID-19 period, most students' academic performance was very high as compared to the pre-COVID-19 period. According to [62], a possible reason that could explain this was the academic freedom that students experienced in using online learning environments facilitated with different tools to ease their access to teaching and learning. These tools include but are not limited to hardware tools (laptops, mobile phones, notepads, and others), and software tools (social media sites, learning management systems, and others) [63].

Nevertheless, higher education institutions mostly from developing countries in Africa are yet to benefit from the full range of opportunities that technology-enhanced teaching and learning including student support tools like the Auto-Ad offers. Learning support software that helps track the trajectory of students' academic performance [64] needs to be available and provided for students. However, the student population from South African universities is from diverse backgrounds, and access to technology can be a barrier. The inaccessibility to technology is caused by several issues, including the digital divide, limitations for students from distant places or rural communities with inadequate connectivity [65].

A few limitations to the effective use of technology-enabled support to students in South African universities must be acknowledged. The impeding factors of the digital divide among the student populations [66] are major concerns. Pitched against these factors are particularly those students coming from remote areas and rural schools where it is hard to connect to the internet due to poor connectivity [65]. Likewise, poor access to hardware like laptops and computers [66], as well as the cost of data [67]are other factors to consider. Another important factor is the students' levels of digital literacy and competency in the use of computers and digital devices for learning in university [26]. In addition to the aforementioned is the crucial factor of facilitating digital intelligence [68, 69] that students require to utilise technology-enabled teaching and learning resources effectively and safely.

Despite limitations, research findings [70, 71] on students' motivation and use of technology to enhance high academic performance suggest that the lack of a creative and interactive online environment that supports students' academic performance demotivates students and they ended up performing lower. This suggests that though there are impediments, students' need for technology-enhanced online support such as automated academic advising exists in the South African university context. Automated academic advising could create a support environment where the students meaningfully engage to boost their academic performance. [72] concur with [73] in confirming that online tools that track student academic performance can assist universities in predicting

students' poor performance while providing incentives to help them motivate and boost high performance.

Hence, the prospects of automated academic advising as a technology-enabled support in the university might in addition to automating advising for the student online, augment their other academic support for success. Secondly, it would enhance the support experiences for the students by positioning them in strength rather than risk. This is because the student would be given access to clear information and acknowledgment of current performance and class of degree [18]. The goal would be to proactively encourage the students with options and nudging incentives towards improvement of results and attaining their optimal performance. Lastly, it would add new insight and inform evidence-driven academic support practices that can lead to the valuable expected success outcomes in the South African university.

Final thought

To facilitate academic support for student success in the South African university context, it is crucial to adopt the opportunities that technology-enhanced pedagogy offers for innovating the support experiences that encourage students' optimal performance. Our anticipation is to see this approach of leveraging the student strength using automated academic advising form the basis of support to encourage student's behavioural changes, enabling their development of important skills and self-authoring abilities.

Finally, studying how the high-performing students adjust to the mediation of support using the Auto-Ad provided valuable insights. These data-driven insights are going to be useful in enabling our understanding of possibilities, drawbacks, and promises of using Auto-Ad as a technology-enabled academic advising and support tool. Further than that, it will enable better tracking of students' performances and mapping areas to direct support resources for individual students. It will aid in designing the advising and academic support experience for the students to enable their access to guidance and assistance in a personalised manner to boost performance at full potential.

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