

Using data to evaluate and enhance programme curricula

*Practice, data, needs and concerns at the University
of Edinburgh*

Project report

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1. Executive Summary

Using business intelligence to inform decision-making is a common practice in higher education today, and learning analytics has emerged in this context as a data-based approach to enhance our understanding of learning and learners, thereby optimising educational quality. However, a key challenge that confronts higher education is the institutional capacity and capability to use of data effectively. In the context of quality enhancement, it is particularly important to examine relevant data practice for the monitoring of academic programmes so as to ensure that programme curricula meet the needs of students and the employment markets. Although the University of Edinburgh has provided comprehensive support resources to assist teaching staff in their work related to the enhancement of programme design and teaching practice, there is insufficient understanding of the extent to which existing support is effective or adequate. This is an important issue to explore when the university positions itself strategically to continue its leading role in global research and education in the new decade. To this end, this pilot study set out to:

- explore the existing use of data and identify staff's needs in activities related to the evaluation and enhancement of programme curricula, and,
- explore staff's potential concerns with using data and analytics tools to inform curriculum decisions.

In order to explore the practice, needs and concerns of staff related to using data and analytics tools to inform the evaluation and enhancement of programme curricula, this study adopted a qualitative methodology to explore the perspectives of staff on these issues. A total of 19 staff participated in five focus groups and one individual interview. The participants came from 13 different schools and their administrative roles included course organisers, programme directors, personal tutors, subject or discipline heads, school directors of teaching, school directors of quality, among others. The discussions were facilitated with a list of semi-structured questions. With consent from the participants, these focus groups and interview were recorded, transcribed, anonymised, and analysed using a thematic coding scheme and specialised software (NVivo). The main findings are presented in this report according to themes and complemented with selected quotes which reflect the views of the participants.

Findings suggest that, in line with existing national and internal policies, the evaluation and enhancement of programme curricula involved a range of periodic activities and diverse stakeholders who made use of various types of data. The schools shared

similar patterns in terms of these activities, stakeholders and data, but each programme and subject or discipline also appeared to have unique needs and characteristics.

In terms of data used by staff, we identified five main types and details are included in Appendix A. With regards to the needs of staff in effectively using data to evaluate and enhance programmes curricula, we identified various areas related to accessing, processing, and reporting data. For accessing data, participants voiced the needs of further training to use available data and systems, gaining effective access to datasets and aggregated data from programmes' courses and students, and obtaining larger amounts of in-depth feedback by programme students. The participants expressed a need to systematise the analysis of programme curricula and to scale up staff's analytical capabilities for curriculum evaluation and enhancement, especially the need of tools that help to *analyse programme courses including their structures and relationships with each other*. In terms of the reporting of data for the evaluation and enhancement of programme curricula, we identified that staff needed to: 1) receive actionable data that enable them to address problems and questions pertaining to curriculum quality; 2) receive reports that speak to audiences with different data literacies, and 3) be able to produce different types of reports for various stakeholders.

The study also identified a number of concerns related to the use of data and analytics tools to inform decisions for curriculum enhancement. These concerns can be categorised into educational, privacy, ethics and practical concerns. The main educational concerns were the risks of uncritical and non-contextual interpretations of educational data, and the effectiveness of using data and tools to achieve educational quality. Privacy related concerns are the risks of harmful uses of personal data of students and staff. Ethical concerns highlight the need to balance the risks associated with data usage and the loss of opportunities to make effective decisions based on insights obtained from large datasets. Finally, practical concerns were particularly related to time-shortage of teaching staff and their needs of adequate training to effectively integrate data and tools in the evaluation and enhancement of programme curricula.

In light of the findings, three main recommendations are made. The first recommendation is for the university to focus strategic efforts on increasing analytical capabilities among staff via further training for the use of curriculum analytics. The second recommendation is for the university to support larger studies to engage the university community in learning and sharing about the use of data and needs in their own subject and programme contexts. The last recommendation, in close connection with the important concerns raised by staff, is for using data critically when evaluating and enhancing the curriculum, to ensure data is used for good. Following these recommendations, it is expected that the university will be better positioned to assess

how, and to which extent, the use of data can help teaching staff to keep programme curricula well-informed and relevant, and, in this way, to ensure the educational quality.

2. Introduction and Study Objectives

The University of Edinburgh has been a world leading institution for both teaching and research for more than 400 years. As we enter a new decade of the century, it is important to examine existing challenges and explore new opportunities to reposition the university strategically to ensure the offering of high-quality education. One of the key challenges that confront the university is to ensure that the designs of programme curricula provide the best learning pathways for students, while being responsive to the dynamic and rapidly-changing knowledge-bodies, professional practices, technologies, graduate employment markets, and local and global scenarios.

The university provides various ways of support to assist staff in the process of programme and teaching enhancement. For example, existing systems for course organisers and personal tutors to access key information about specific courses and students are such as EUCLID and learning management systems. Recently, a new business intelligence tool—[PowerBI](#)—was introduced to staff to enable easy access to key data for the annual monitoring of programmes. Although the support provided by the university seems comprehensive, it is not clear whether existing resources meet the informational and analytical needs of staff who are responsible for the enhancement of programme curricula. Considering the rising emphasis on data-informed decisions in educational sectors, it is particularly important to investigate the extent to which staff at the University of Edinburgh are able to access and capable of making use of relevant data and tools to ensure suitable learning pathways and quality learning experience for all its programmes of study.

To this end, this study set out to explore existing uses of data in the process of evaluating and improving programme curricula at the university, so as to identify needs and opportunities for training and further development of tools to help teaching staff in

this key work. In addition, the study investigated concerns that staff might have towards the use of data and analytical tools to assist with the monitoring and enhancement process of programme curricula. This report responds to three main research questions:

- What are existing data practices for curriculum evaluation and enhancement?
- What are the needs of staff in terms of using data for curriculum evaluation and enhancement?
- What are staff concerns about the use of analytics tools for curriculum evaluation and enhancement?

By attempting to answer these questions and discussing the implications, we hope this report will provide valuable insights for the discussion and practice of different stakeholders from the university involved in the quality enhancement of programme curricula. In particular, we hope the identified opportunities and challenges will inform the university's future strategy and the support for teaching staff related to the use of data to develop better curricula, learning pathways and programmes of studies.

3. Study Details

In order to understand existing practices, data used, needs and concerns with the use of data for programme curricula enhancement, we adopted a qualitative methodology to explore the perspectives of teaching staff.

This study involved 18 teaching and one administrative staff involved in curriculum planning and timetabling. The participants came from 13 different Schools within the three Colleges of the University. The roles of participants include Lecturers, Course Organisers, Personal Tutors, Programme Directors, Directors of Subject areas, School Directors of Teaching, and School Directors of Quality, with some participants holding, or having held, more than one of these roles. The sampling focused on staff who were directly or indirectly involved in the process of curriculum evaluation and enhancement.

During September and October 2019, five focus groups and one individual interview were conducted. With the consent from participants, we audio recorded the conversation with each group and individuals. Each focus group lasted for one hour approximately, and involved participants of mixed roles and from different Schools. A set of questions were prepared to investigate the following aspects related to programme curriculum evaluation and enhancement: 1) evaluation activities, 2) learning pathways, 3) data usage, 4) challenge, 5) curriculum analytics, and 6) concerns (see Appendix A). All the interviews were transcribed and anonymised. A thematic analysis was adopted to interrogate the data, using a semi-structured coding scheme and specialised software (NVivo) for qualitative data analysis. The researchers first developed a set of codes based on relevant literature. As new ideas emerged from the data during iterative reading and rereading of the transcripts, the coding scheme was modified continuously to allow the addition, deletion or revision of codes until it reached 'saturation' (when the coding scheme was comprehensive/ stable enough to allow the capture of all the ideas related to the research questions). The final coding scheme included the following themes: 1) activities of curriculum quality, 2) used data, 3) Desired functionalities of tools, 4) concerns, and 5) views of existing analytics tools (see Appendix B). Findings from this exploratory analysis of the focus groups discussions are presented with selected quotes in the next section.

It is important to note the limitations of this study. Firstly, with limited resources and the busy schedules of the participants, the study allowed participation of a small sample and thus the findings cannot be generalized for the larger staff population.

Nevertheless, the study involved teaching staff from over a dozen of Schools, and the insights obtained from this study may serve to inform a larger study in the future.

Secondly, due to the scale of the study, the exploratory analysis focused on exploring the most prominent issues, needs and concerns and thus the findings should be considered as an initial reference for further in-depth research into each of the topics discussed in this report. Finally, this study captured the perspectives of staff at a particular time in the University's history. Developments after this data was collected and analysed are likely to change the needs and support for staff associated with the enhancement of programme curricula. This study then only makes reference to a

particular temporal context and future work and studies should refer to these findings accordingly.

4. Study Results

In this section, the exploratory findings for each research question are discussed.

4.1 What are existing data practices for curriculum evaluation and enhancement?

From the exploratory analysis of the focus groups conversations, it was found that the assessment and enhancement of programme curricula at the University involves a diverse range of periodic activities and key stakeholders, who discussed various and complex sets of information. These activities were commonly led by Programme Directors who worked in a in collaboration with Course Organisers, School Directors of Teaching, School Directors of Quality, Student Support staff, Personal Tutors, and teaching and administrative staff. In some degree programmes, especially undergraduate, these activities were often led by Subject/Discipline leads. Importantly, programme evaluation also normally includes collaboration from students and their representatives, and from external examiners, alumni, accreditation bodies, among other stakeholders..

The process of curriculum evaluation typically requires the analysis and synthesis of a range of information from several sources. There is a reporting chain from each programme to different stakeholders in the subject area, school, college and university levels. One participant briefly summarised the common process related to programme annual monitoring:

“That involved dealing with [...] assessment data, examiners reports [...] as well as textual responses by students as part of my mid semester reviews, course evaluation, every information... [and] read that and synthesise it and report it back”.

Another participant gave more details on the types of issues considered when evaluating programme curricula:

"We meet as a cluster of programmes in [our subject area] and we would look [...] at the marketing, recruitment, [...] student achievement things like [that] but mostly we were talking about sort of structural issues with the programme, [...] so the way in which the courses are linking together, whether we think the programs aims are actually being facilitated...the learning outcomes are doing their job, the assessment is ok you know that kind of thing."

However, participants also voiced that beyond annual monitoring and curriculum review, which occur over a period of years, other activities during the academic year were the basic and more frequent instances where issues related to programme curricula are identified, reflected and discussed. Examples of these instances are meetings from: teaching committees, board of studies, board of examiners, student-staff liaison committees, progression boards, and personal tutors' meetings with students for guidance on course enrolment, etc. In synthesis, the enhancement of programme curricula involves a range of activities, stakeholders, and information drawn from diverse sources.

4.1.1 Different contexts, different needs

Although the activities and stakeholders involved in the evaluation process appeared similar across Schools, it is noteworthy that different structures of programme curricula result in different needs for data and analysis techniques.

Participant 1: "in [our School], we have accredited degrees and in a sense the pathway, singular, is mapped by accreditation requirements. We have lots of learning outcomes and programme outcomes that are checked on lists to see that every student meets exactly the... professional outcomes, and in some of our degree programmes we have no choice for the first three years [...]"

Participant 2: "Ours is very much the opposite. So, there's a huge amount a' choice for our [largest programme], especially on Honours, and classes can be huge as well. There's a lot of complexity within that and [...] quite a lot of my job is to try and figure out what courses should run year to year... And that's actually very difficult so actually an increased amount of data to help us make that decision would be really helpful."

Due to the unique context of each subject discipline and teaching traditions, unique informational needs and evaluation criteria were found to be required in each programme and School. For example, one participant pointed out the issue of having a standardized evaluation across all the programmes:

“I think that’s where you run the risk of suggesting all course should aim to be the same and I think that’s where things and some of my colleagues could get very nervous around that. So what I am always striving for is to ensure that the experience, the academic experience is comparable but not the same because it shouldn’t have to be the same and I think that is something that is really, really important”.

In a synthesis, in this study it was found that there is a diverse range of activities, stakeholders and data involved in the informing the evaluation and enhancement of programme curricula at the University. All Schools, in alignment with the University-wide quality policy, shared common patterns in the activities, stakeholders and information used in the enhancement of programme curricula. However, it was also found that all Schools and programmes had unique context, teaching traditions and needs, generating unique adjustments to the activities, stakeholders and data used for each case. About the diverse datasets used by these different stakeholders, we identified and organised these in a number of categories based on the type of information. This are presented and discussed next.

4.1.2 Typologies of Curriculum data

The study identified a number of data sets commonly used to assist with programme evaluation, though the degree of interest varies in each case. These datasets were organised by types, as summarised in Table 1.

Table 1. A typology of data used for curriculum evaluation and enhancement

Type of data	Description
Learning Data	Data from the curriculum and assessment of courses or modules, such as course names and codes, learning outcomes, learning activities (e.g., lectures, tutorials, labs), learning materials (e.g., reading lists),

	assessment types (e.g., essay, exam, project), assessment dates, assessment results, etc.
Students and Applicants Data	Data about existing students and applicants of a programme, such as enrolment number per programme and per course, number of applications per programme, number of applicants matriculated, number of programme transfers, student retention, student background (e.g., nationality, age, prior educational background, and disabilities), marketing metrics, etc.
Stakeholder Feedback	Feedback received from programme-related stakeholders such as teaching staff and course organisers, students and student representatives, external examiners, School Directors, alumni, etc. This type of feedback is normally associated with particular elements of course curriculum, assessment, or programme/School assets.
Programme's Resources Data	Data about characteristics, use in the programme and performance of the human, physical, digital and resources, such as the required teaching staff, professional support staff, admin staff, teaching spaces, library and study spaces, specialised learning equipment or software, etc. In many cases these may be administered at the School or other levels.
Enhancement Data	Data related to enhancement work and impact in courses and programme, such as curricular problems or requests, action points, changes implemented, impact of changes, etc.

The first dataset in Table 1 (Learning Data) gathers all the information of Programme's Courses. From the basic information such as the name of courses, the number of credits and course pre-requisites, to the details of: the course learning objectives and activities as lectures, tutorials, lab work, etc.; the course learning materials; and, of the course learning assessment such as the assessment type, evaluation criteria and results. The second type of data proposed (Students and Applicants data) corresponds with data about the number and background of programme's students and applicants. The amount and background of students in each course, the number and origin and destiny of programme transfers, the number and background of applications and matriculated students and so on. As the number and background of current and projected students influences the planned number of courses and sections, the educational adjustments of courses, the number of teaching staff and other resources,

this information is also crucial for an effective implementation of programme curricula. The third type of data proposed (Programme Resources' data) corresponds of information related to the different human, physical and digital resources required for an effective delivery of the programme, including the teaching staff involved in programme courses. These resources available influence programme curricula as well as its effective implementation. The fourth type of data proposed in this analysis (Stakeholders' feedback) comprises the vast amount of feedback, especially textual comments, provided by the range of stakeholders who review different aspects of the programme curricula. This type of data was repeatedly voiced by staff as critical and one of the most effective for assessing and enhancing programme teaching and curricula. The final type of data (Enhancement data) is related to information about the programme enhancement processes, plans, actions and impact. This information is fundamental as it allows teaching staff to: organise and coordinate the efforts to enhance programmes, including the curriculum; to keep track of previous curricular discussions and decisions, and; to evaluate the impact of the actions taken.

After a brief synthesis of the exploratory findings of the current practice and data used to enhance programme curricula at the university, we now present the insights obtained about the needs of staff related to the use of data for curriculum evaluation and enhancement at the programme level.

4.2 What are the needs of staff in terms of using data for curriculum evaluation and enhancement?

Our analysis identified a number of needs related to the use of data to enhance programme curricula. The staff needs are organised based on the type of action involved: 1) accessing data, 2) processing data, and 3) reporting data.

4.2.1 Accessing data

Needs related to accessing data include collecting and importing data for programme curricula analysis. The participants voiced different challenges related to gaining access to data which could help enhance programme curricula. Three key needs have been identified.

Further training for teaching staff to ensure effective use of the existing data and systems provided by the university

First, there is a need of further training or communication of training for teaching staff in the effective use of systems and data currently provided by the University. For example, despite the availability of [training resources](#) for a new tool, Power BI, several participants indicated a gap of understanding and skills:

Participant 1: There has been very little exposure of that new tool [Power BI] to teaching staff and...

Participant 2: I'd second that wholeheartedly.

P1: ...those people [...] who are asked to use it go, 'what's it about and how do we use it'.

P2: Yeah.

Participant 3: Yes.

P1: So, there is a bit of a gap there in training. Which I think the university should do something about.

In fact, even with systems that have been commonly used across the university, not all staff were adequately prepared to use them:

"[...] it is striking, sometimes you have conversations with colleagues, and it does unearth that pretty basic aspects of EUCLID and really kind of quite foundational crude data that people don't feel confident about."

Efficient access to existing datasets and aggregate data from programme's courses and students

The second key need is to gain efficient access to existing datasets and aggregated data from courses and students. Programme curricula is a complex sequence of courses. Without efficient access to these datasets and aggregated data across courses, the capacity of staff in the use data for programme evaluation and

enhancement remains limited. Several participants expressed the frustration of knowing the existence of certain data but not being able to access it at all or efficiently.

“[Programme’s] data is all there. I know it’s there. But I can’t get it [laughs].”

“I can [get data] for any individual student but if I try to do things systematically, I cannot. Theoretically, we have the data but I’m not able of linking that in the aggregate [manner], [...] that would be days long work of manually translating the data”.

More in-depth feedback from programme’s students

The third key need is to obtain access to greater amounts of in-depth, teaching-relevant feedback from programme students. Although the results of national and institutional student surveys were made available to staff on a regular basis, the participants raised a number of gaps and challenges. In synthesis, the central issue appeared to be that national and institution-wide survey questions provided limited quality and quantity of qualitative feedback to investigate issues relevant to the evaluation of a particular programme. The issue is particularly important as staff repeatedly voiced that student feedback was crucial for enhancing programmes’ courses and curricula. One participant summarised this critical limitation in teaching staff analytical capabilities.

“Student feedback clearly is critical and I think [...] it is, it’s disconnected with everything else that we do [in our programme]”.

Another participant reflected on the same gap and provided a clear example of the importance of student feedback to identify concrete opportunities which can be used to enhance courses and refine programmes curricula.

“It’s obviously not useful at a central level to have loads of textual feedback about highly specific things [laughs]. But it is really, that’s the really important stuff at the course organisational level cause it’s like, ‘oh the field trip is too long, okay I’ll shorten it’ [...] things like this that really mean something.”

After discussing that staff at this time needed to improve their access to data for programme curriculum evaluation and enhancement via further training to use existing systems, gain efficient access to data from courses and students, and by obtaining greater amounts of in-depth feedback from programme’s students, next are discussed the identified staff needs related to analysing or processing data in this context.

4.2.2 Processing data

The accessible data needs to be analysed to generate useful information to inform curriculum enhancement. Two key needs about processing data to inform curriculum enhancement have been identified.

Further systematising the analysis of data for enhancing programme curricula

Firstly, there is a need of staff to further systematise existing approaches to analysing relevant data to evaluate and enhance programme curricula. Several participants pointed out that the data used to evaluate programme curricula were often analysed in 'one-off', ad-hoc, non-systematic ways. As a result, staff described limitations in replicating and improving the analysis in periodic ways, and the extra effort of constantly 'reinvent the wheel'. Also, participants mentioned that the information generated by these ad-hoc ways is often not comparable across the Schools.

Scale-up staff's analytical capabilities for curriculum evaluation and enhancement

Secondly, there is a need to scale up the analytical capabilities of staff, via further training and analytics tools, so they can process data in ways that generate useful information for curriculum evaluation and enhancement. As discussed in the previous section, staff voiced facing challenges of inefficient access to certain datasets and to aggregating data from programmes' courses and students (e.g., comparing data across courses). Furthermore, participants voiced the need to have the analytical capabilities to make sense of data in order to effectively inform the planning, evaluation and enhancement of programme curricula. For example, one participant commented on the poor quality of student recruitment data and its impact:

"We'd get reports from our college on [recruitment] activity information but actually that wasn't very good quality so we had to rely on our own systems and really kind of in terms of recruitment it's really competitive market and if we, if our numbers fall we lose staff, you know, that's my colleagues, so the very kind of acute sense needing to get that right".

Although the university has provided relevant tools to track student recruitment, a number of participants shared challenging experiences in obtaining useful and quality

information. In particular, staff who were responsible for postgraduate-taught programmes raised this issue more frequently than other participants.

In addition to recruitment data, the participants have also expressed a desire to obtain information about the relationship between student learning backgrounds and their performance so as to identify optimal learning pathways. For example, a Teaching Director discussed their experience when evaluating the structure of a courses for joint-degrees:

“I wanna know how the students from different schools are doing mark-wise, or even different types of assessment methods [in our courses] [...] without doing something on an Excel file and then going through a very, which I’ve done once, I think, and said I’m never doing this again, it took me too long.”

Another participant made a similar comment related to the evaluation of a course:

“Knowing what [...] courses they have done before coming to my class, that would be extremely helpful. I mean, at the moment, we don’t have the time to go through and look them up [...]”

The examples presented above also highlight a common desire among the staff; that is, a tool that can effectively save their time and efforts in manually processing data. The same point has been emphasised when it came to the importance of accessing and processing qualitative feedback from students.

In addition, we observed an interest in predictive analytics that may allow staff to make long-term plans.

For example, a participant who oversaw multiple programmes in his School commented:

“One of the things that strikes me about a lot of the data that we currently generate is that I think of it being very much as in the present tense. It’s about observing, reflecting on the interactions that’s happening now. In my experience [...], use data less for “is”, [but] for work that actually looks back at where a student or a programme has come from or work ... about where students might go next.”

A forward-looking mindset is crucial to ensure that educational offerings meet the needs of students in a fast-changing environment, and appropriate applications of predictive

analysis may generate valuable information to enhance programme curricula at different levels.

Having discussed the needs of staff of further systematising the analysis of data for evaluating and enhancing programme curricula, and to scale-up staff's analytical capabilities for these activities through further training and relevant development of tools, next it is discussed about the needs of staff about communicating or reporting data in this context.

4.2.3 Reporting data

How processed data is reported and communicated can affect effective use of data to inform programme evaluation and enhancement. The study identified three key needs in this area.

Receive actionable data to inform decisions about existing curricular questions and problems

Firstly, the reporting of data needs to be problem-oriented and the communication needs to be efficient. In line with existing research in learning analytics, the participants expressed a desire for data that can inform decisions and actions while saving them time from mundane work.

“Any new form of data, regardless of how it’s presenting, it needs to first answer existing questions that we can’t answer. If [data] does something on top, so basically [...] improving the current practice, I agree. That bit wouldn’t be enough to justify doing it probably.” If it helped me actually save time on some of the really mundane practical things in the first place and opened up more space to think, therefore, about these implications and changes... that’s partially what I mean with it needs to be integrated.”

“I haven’t got a day to look over this, I’ve got half an hour so it has to be a traffic light sort of [thing], you need to see...get it...first glance yeah.”

Considering the large amount and diversity of information related to programme curricula, the aspects of time-saving and new knowledge are crucial to the buy-in of staff under existing workload when it comes to institutional support of analytics tools.

Receive reports that consider audiences with different data literacy skills

Secondly, the reporting of data needs to consider different data literacy skills among different stakeholders and in different disciplines. For example, although some participants appreciate analytic tools, such as Power BI, which allow users to interrogate a large dataset and generate a wide range of reports based on needs and interests, some participants indicate the difficulty to wade through the information and instead would prefer a summary document reporting a departmental level overview with some headline figures and diagram.

“There’s sort of an assumption of a certain level of data literacy within the academic community which I think is just incorrect. In a School like mine [Humanities] where a lot of us are basically just, you know, we have no numeracy skills whatsoever, but we are just really lucky we have a wonderful person doing the QA job who is statistically literate otherwise we would be stuffed.”

Produce reports for different stakeholders

Thirdly, the accessibility and flexibility of data reporting systems needs to increase to ease the process of sharing key information with relevant stakeholders. For example, a number of participants commented on the difficulty to export data from the university's main data management systems to create reports needed for the monitoring process of programme curriculum. One participant shared their experience exporting student names and marks from Learn to share with the external examiner:

“I can get a list of the data that I wanted but ordered by the first name of the student alphabetically, and there was no way to get it rearranged [...] I ended up having to do this, I couldn’t believe that I was doing it. I copied and pasted [laughs] the data off the webpage into a text file, processed it with a script that I wrote to turn it into CSV, put it into Excel and reordered it [laughs]. It’s bad, having to screen scrape the data out of your own system, it’s unbelievable.”

The case presented above is another example of the demand of certain computational skills that should not be assumed to be present among all the staff. In sum, staff desire for a better access to data and the flexibility to generate reports for targeted audience.

Despite the observation of interest in using data to inform the evaluation and enhancement of programme curricula, there are inherent issues related to the use of

data in the educational sector. In the next section, we discuss the concerns voiced by staff about the use of analytics tools for quality enhancement purposes. 4.3 What are staff concerns about the use of analytics tools for curriculum evaluation and enhancement?

In this study, we have identified three areas of concerns associated with the use of analytics tools in the context of programme curriculum enhancement: educational, privacy and ethical, and practical concerns. These are summarised below.

4.3.1 Educational concerns

Two themes related to educational values have emerged from the frequently mentioned concerns: complexity of data and potential bias and educational effectiveness.

Complexity of data and potential bias

The participants expressed in various ways that learning is complex and contextual, so is data generated in educational contexts. As a result, it is important to consider the intentions behind algorithms and reflect on the nature of data that goes into analytical systems. For example, one participant expressed concerns about disregarding context-specific factors in the design and use of analytic tools:

“I am a bit concerned about who would decide the things [to] look for because I think that different types of subjects define skills [...] in very different ways and I think what we value, what we think is important and what we are trying to highlight and achieve with our degrees may very well be quite different from the sort of things Informatics courses try to achieve and I am always a little bit concerned that it would be one size fits all, so I think any system that starts looking for this data would have to be very much aware of that and I know that at the moment there is a big discussion about bias, inherent bias when it comes to data development as well”.

Although several participants express support of using data to inform quality procedures, they cautioned potential misuse of data and highlighted the importance of transparency. In the words of one participant:

“Data is only as good as the people that are using it and the reasons [why] they are using it [...] has to be embedded in the conversation about what [is] going to happen next...”

Educational effectiveness

As have discussed earlier, staff desired for information that are oriented towards existing problems. A primary concern shared among the participants is the effectiveness of adopting analytics tools to improve programme curricula, and the extent to which the efforts put into processing and interpreting data is rewarded with new insights.

“I can see something like this being potentially pretty useful in [programmes] where you have a lot of courses, then the relationships between them can be quite complicated. I think in the sort of situation that I work in where I’m the programme director, it wouldn’t really offer us that much because we have relatively few courses.”

“Quantitative information, it has maybe some kind of role, comparative role, but I’ve never heard it really informing substantive and certainly not aspirational conversation about...teaching at programme level.”

As also demonstrated earlier, context plays a key role in effective use of data and analytic tool. Here, we should also be aware that the usefulness of, and hence need for, any type of data and tool can be context dependent.

4.3.2 Privacy and ethical concerns

Privacy

The idea of applying analytics tools to support curriculum enhancement has attracted concerns about privacy related to the use of student and staff personal data. In particular, issues and dilemmas around access control and surveillance are particularly pronounced:

“Who has access to what level of information can be tricky [...] I mean, I’m very interested in all that stuff, I want to have information but I’m working with colleagues in data protection law and, you know, AI (Artificial Intelligence) and algorithms where their day-to-day job is to try to limit the amount of personal information that is out there and is being processed. So, you know, there is a

bit of a tension between how far we can go, how far we can trust ourselves in doing that.”

“I sometimes wonder whether we [have] too much data [...] on our students actually and whether there’s a degree where kind of...take some autonomy away, because they feel the whole time that everything’s recorded so they don’t have the responsibility to monitor [things] because they get a reminder [...] In a sense that’s good. The problem is it’s become so pervasive...”

In addition to matters about student privacy, the privacy of staff members, particularly of academics, was also a topic that emerged across several discussions about teaching autonomy, staff well-being and employment. As a result, important safeguards, such as consent-seeking, anonymity and access control were frequently mentioned by participants.

Ethics

In light of potential risks in privacy intrusion and misuse of data, as discussed earlier, the participants expressed conflicting feelings about using student data in curriculum evaluation. For example, one participant commented:

“Obviously in principle, if one has more data then you can potentially [...] do more things that are helpful to individuals. On the other hand, you can do things which are not helpful, so how you use it is the issue, and it’s very difficult to control that precisely.”

Despite the delicate balance required to justify the use of student data, some participants highlighted the university’s fiduciary responsibility to look after students:

“There’s no point in having the information surely and knowing that certain things affect outcomes and not making use of that information. That seems to be absurd.”

“There’s more risk that we’re not doing as much as we could to help people, than the risk that we’re doing more than we need to harm them.”

In view of the potential loss of opportunity to support students due to ethical and privacy concern, one participant pointed out the need for staff education regarding the balance between ethical and effective use of data to support students:

“If they disclose their learning adjustments to the student disability service and told us all these things, they want us to know, and some colleagues feel like,

well, I can't reach out to a student with this type of disability cause that's private. I'm like, well, no, that's why they told the university about it, so please do email them, be like, 'Do you need help contributing to a group discussion?' That's why they told us. And people get really mixed up about what they can and can't know."

Although the participants were critically aware of various ethical and privacy implications related to personal data, the overall perception suggests a cautious but supportive attitude towards a data-informed process of curriculum evaluation and enhancement.

4.3.3 Practical concerns

Another key area of concerns raised by the participants is related to the practical use of analytic tools. Broadly speaking, these concerns are associated with capacity and capability. In particular, the most prominent challenges are 1) the lack of time of academic staff to learn and use new tools, and 2) the knowledge and skills required by all stakeholders to adequately use data to inform curriculum enhancement.

Capacity

Capacity related concerns focus on the resources required to employ analytics tools and act on the results. The lack of time is an issue consistently raised by the participants.

"There's an equation between how long we spend looking at data and how long we spend looking at students."

"For me, I just get fatigued by all the fancy dashboards...you can do this, you can do that...I don't have time."

In addition to time shortage, there are concerns about the implications to staff employment and career progression in terms of how we act on data. For example, a participant indicated:

"There is a risk that you can start saying well, maybe we should offer more popular courses and then you have this tension with what you do about colleagues that don't teach that? What do you do when they leave for whichever reason? Who do you replace them with?"

The potential impact of using data and analytics tools to inform curricular decisions can raise important questions about how data could influence which 'knowledge' is taught in the university, how it is taught, and the possible tensions with the principles of academic autonomy.

Also related to resource capacity is the integration of a new analytic tool into existing systems and having a rigorous process in place to ensure trustful results. One participant commented:

“It would have to integrate with the other systems. If it was kind of a new additional system [...], I doubt that a lot of people would end up using it in kind of a mainstreamed way.”

Another participant emphasised the importance of having a rigorous process to ensure the validity of information use of data when informing programme curricula:

“There’s a process laid down that things are done in a correct way. There is more than one correct way, but these processes are in place and if I know that those processes are in place then I am happy with that. But if somebody just gave me a piece of paper, I don’t have the knowledge to be able to assess whether that’s appropriate, particularly if it’s not in my area. So, for me it’s much more about process than information.”

Overall, these concerns show that the adoption of analytics tools to support curriculum enhancement will be conditioned by the resources available for individuals and for the institution.

Capability

As described previously, the need of further training to ensure adequate skills among staff to make use of data or analytic tools was a frequently voiced opinion by participants. A participant pointed out the risk of producing undesired outcomes due to the lack of understanding or skills:

“It’s exactly the case that we’re getting feedback from students and the course evaluation questionnaires which is meaningless because only twenty-five percent or thirty percent of the students actually filled it in but that information is then going to subject area heads or the teachers involved or heads of department, and if they don’t have the digital literacy skills to actually look at

that and go this is meaningless, they can have actually very serious ramifications for that person and we are very, very worried about this”.

On the other hand, participants also discussed the need to improve students' understanding of quality enhancement processes and practical constraints.

“We can come across as really quite corporate as an intuition, I think that is a problem with the way we communicate with our students [...] I think more work needs to be done around that but also at the same time ensuring that students don't think, 'Well if I [say] this then I will have my way and this will change.' I think that may be some things around data literacy and understanding of what is doable.”

Overall, we observe interest in using data and analytic tools to support the process of programme curriculum evaluation and enhancement, and the concerns expressed by staff point us to strategic directions for effective use of data in the university. In the next section we share discuss the implications of the study results.

5. Discussion and Recommendations

This study explores how data is used by different stakeholders to evaluate programme curricula at the University of Edinburgh. We identified a number of needs limiting the analytical capabilities of staff in carrying out this task, and highlighted concerns related to the use of analytic tools and data. Based on these findings, we propose three key recommendations.

Increasing the curriculum-related analytical capabilities of staff by expanding training, data and tools provided to staff

The first recommendation is for the university to generate focused strategic efforts on increasing the analytical capabilities of teaching staff such as further training and expansion of tools and data provided to teaching staff. To ensure continuous improvement of educational quality, it is crucial to align programme curricula with the needs of students and the fast-changing world. Key to the activities of curriculum evaluation and enhancement are the ability and tools to make sense of relevant data

and act on it. Based on findings from this study, to increase staff's curriculum-related analytical capabilities, novel efforts in training could focus on the following areas.

- *Strengthening staff's awareness and practical skills to use systems and data provided to staff.* This could be addressed by disseminating renewed, more comprehensive and easily-accessible online instructions for staff on how to use systems and data provided by the university that can be of help for curriculum evaluation and enhancement, such as information provided in Euclid, Learn and the novel Power BI suite. This critical material should be continuously improved and updated in parallel with new changes to each relevant systems and data provided to staff, to ensure all teaching staff can find the key information for curriculum evaluation and enhancement in efficient and effective ways.
- *Improving data literacies among staff.* Results indicated that staff are aware of different data literacy levels in each school, and of the related limitations for using data to inform curriculum decisions. If the university aspires for effective use of data to inform curriculum enhancement across the institution, it is necessary to bridge staff's skills gaps for basic practical analysis of quantitative and qualitative data related to the evaluation of teaching and curriculum of programmes. Key examples are the analysis of basic statistics from courses and programmes, and the critical analysis of written comments by students and board of examiners. This appears to be a more challenging training endeavour, yet levelling-up basic data literacies of teaching staff should generate impacts far beyond general curriculum enhancement, thus systematically strengthening university's teaching and research.

From the findings of this study, we recommend the university to further explore the following areas to improve the data and systems that support staff to inform curriculum improvement.

- *Explore useful datasets and aggregate data available to teaching staff so they can see and analyse the curriculum in higher detail.* With Euclid, Learn and other systems, teaching staff can find data about individual students and courses, and, with the recent addition of the Power BI suite, staff can also find programme

overall metrics now. Yet there is a gap in existing systems to provide integrated data from different courses and programmes, which is crucial for curriculum evaluation and enhancement. Further efforts should aim to give teaching staff access and analysis capabilities to work with integrated data from courses and students which they can only access at individual level currently. In this way, staff can evaluate the curricula of programmes in greater detail and efficiency.

- *Explore new or existing tools which could help to obtain and analyse a greater amount of targeted student feedback about programmes.* This study found that teaching staff at all levels perceived student feedback as critical data to evaluate and improve the curriculum. Yet, it was widely discussed that current systems to collect student feedback (e.g., CEQ, NSS, PTES), although helpful, did not provide the ideal amounts and details to inform curriculum improvement. Further efforts should explore which new or existing tools and processes can be offered to teaching staff to gather feedback relevant to the improvement of curricula from students. A simple alternative could be producing templates of surveys with closed and open questions which teaching staff can adapt for specific curriculum issues. Effective processes to ensure student responses should also be considered.

Keeping learning about the use and needs of data in the evaluation and enhancement programme curricula

The second recommendation for the university, in line with the first recommendation and with the exploratory nature of this study, is for the university to keep learning about the use of data in the practices of evaluating and enhancing of programme curricula across its colleges and schools. This pilot study offers an initial overview of existing practice related to the use of data for programme monitoring. Yet, to ensure continuous improvement of programme curricula and educational quality, the university needs to support further studies in this area. There is a need for a larger scope of investigation into curriculum-related analytical needs of teaching staff across all schools. Colleges schools may use this report to facilitate discussion and learning about the practice and data used to inform curricular improvement in their contexts. In these ways, teaching

staff may be able to refine their practice in curriculum enhancement; the university may be able to better evaluate the usability and usefulness of existing tools, and further inform the development of bespoke training and analytical solutions to address the unique needs of different programme contexts.

Using data critically when evaluating and enhancing the curriculum

The final recommendation is, while going forward, for all stakeholders to use data critically for curriculum improvement. An important range of educational, privacy, ethical and practical concerns by teaching staff about the use of data and tools to inform curriculum improvement have been presented in this report. Overall, the results highlight needs to increase effective use of data and tools in this context. However, future steps require a sensible approach considering the complexity of educational data, the unique nature of each programme, discipline and school, as well as the wider importance and ramifications of curricular decisions for the teaching, research, students, and the wider society. In this way, the university and programmes will be better positioned to ensure that data is used in desirable ways according to our educational and social values.

This report serves to inform the discussion and practice of different stakeholders who are involved in the process of curriculum enhancement at the University of Edinburgh. We hope this report will lead to further studies and support for staff to ensure best practices in the use of data to enhance the quality of education and support for both students and staff.

Appendix A: Data for evaluating and enhancing programme curricula

Table 1 Appendix A: Types of data for curriculum evaluation and enhancement. Datasets and which were found to be relevant for curricular evaluation and enhancement. This is a provisional list and other important data and datasets may not be included.

<p>Learning data (refers to courses, modules, internships, placements, dissertations, other educational activities, and, the entire programme and programme clusters).</p>	<p>Course curriculum and content</p> <ol style="list-style-type: none"> 1. Programme Name 2. Programme qualification level (Certificate, Diploma, Bachelor, B Hons, Master, PhD) 3. Subject or Discipline Benchmarking (e.g., key graduate attributes) 4. Programme benchmarking 5. Graduate Employability (e.g., key potential employment or self-employment alternatives after graduating) 6. Course Name 7. Number of Credits 8. Course Qualification level (e.g., SQF 10) 9. Institutional course regulations (list of regulations which apply to the course) 10. Terms delivered (i.e., first term, second term) 11. Accreditation requirements 12. Course requisites (e.g., compulsory or elective courses, course pre-requisites) 13. DPT - Courses per term (in order, i.e., curriculum table) 14. Learning objectives (skills, knowledge, etc.), 15. Course's Learning Units (e.g., name, unit learning objectives, hours of activities) 16. Course activity type (e.g., lecture, laboratory, tutorial, workshop, fieldwork, dissertation) 17. Course activities (activities, schedules, locations) e.g., Lecture 2, 14/09/2019 3-5 pm, Room X Building Z), 18. Course content and learning resources, 19. Internships/Placements activities demand 20. Dissertation activities 21. Learning resource/content quality (e.g., results of resources or content quality evaluation) 22. Learning adjustments (e.g., to address special learning needs) <p>Course assessment and results (for each course, learning unit, or activity)</p> <ol style="list-style-type: none"> 1. Assessment activities (types, level, weighting, outcomes/content covered, dates) 2. Course assessment criteria
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	<ol style="list-style-type: none"> 3. Assessment results (for students of the course, score, null, attempt number; for formative, summative) 4. Assessment feedback (e.g., feedback, comments and rating by student, response time) 5. Requested extensions (e.g., quantity, reasons, extensions granted) 6. Requested special circumstances 7. Awards (i.e., classification) 8. Failure-rate 9. Drop-out; 10. Difficulty metrics, 11. Course Engagement (Attendance Lecture/Seminar/Lab/Placement, VLE engagement, Reading list engagement)
Programme's Resources data	<ol style="list-style-type: none"> 1. Human Resources (course organisers, teaching staff, teaching assistants, technical staff, support staff, admin staff, etc); 2. Physical infrastructure and systems (buildings, facilities, labs, workshops), 3. Digital infrastructure and systems (VLE, specific systems used across the programme and in each course).
Students and applicants' data	<p>Number of current and projected students</p> <ol style="list-style-type: none"> 1. Students matriculated in the Programme (total, year on year comparison, last 3 years) 2. Students per Course 3. Number of applications to the programme 4. Number of Offers sent 5. Matriculated new students (to start next academic term/year) 6. Programme Transfers (e.g., quantity, origin/destination, motivations) 7. Sustainability (composite index about the present and future economic feasibility of the programme) 8. Marketing metrics (e.g., reach and audience of social media campaigns) 9. Market research (e.g., data from similar programmes from Scottish, UK and international universities) 10. Courses capacity (min-max number of students) 11. Course enrollment (demand and results) 12. Oversubscribed courses 13. Widening participation metrics <p>Backgrounds of Students and Applicants</p> <ol style="list-style-type: none"> 1. Nationality 2. Gender 3. Age

	<ol style="list-style-type: none"> 4. Title (Civil status) 5. Number of Children/Others caring responsibilities 6. Place of residence 7. Academic background, 8. Professional experience 9. Ethnicity, 10. Disabilities, 11. English language skills (e.g., IELTS score), 12. Socioeconomic background
Stakeholders feedback	<ol style="list-style-type: none"> 1. Course Organisers 2. Course Teaching staff (e.g., Lecturers, Instructors, Teaching assistants) 3. Students (e.g., questionnaires and surveys, verbal or text-based comments, ratings) 4. Student representatives (SSLC) 5. Programme Directors 6. School/programme admin/support staff 7. External examiners 8. Board of studies/progression 9. Personal Tutors 10. Alumni 11. Subject or Discipline Heads or Directors of L&T 12. School Directors of L&T 13. School Directors of QA 14. School Directors of Studies (UG/PG) 15. Academic Development (IAD) 16. University/College
Programme enhancement data	<ol style="list-style-type: none"> 1. Quality framework and processes used 2. Course/Programme/Cluster/School issue or request 3. Action points (e.g., agreed enhancements, to-do lists) 4. Changes in implementation 5. Changes implemented 6. Impact of changes 7. New courses (e.g., potential new provision, proposals) 8. Best practices 9. Meta-evaluation

Appendix B: Interview questions

Questions for Programme Directors

Themes	Focus groups Questions	Prompts
Evaluation activities	<p>1) As part of the internal quality process, programme directors are expected to carry out programme evaluation annually.</p> <p>Could you briefly describe what you did to complete this task?</p>	<ul style="list-style-type: none"> - How did you collect evidence to complete the programme monitoring form [*show the form]? - What kinds of data did you use? - Did you need to consult anyone else to complete this review? - What kind of support have you received from the University to carry out the evaluation? Did you find it useful?
Learning pathways	<p>2) Did you need to evaluate the different pathways that students take to complete their degree?</p>	<p>If no:</p> <ul style="list-style-type: none"> - Why not? - Could it be useful in any way? <p>If yes:</p> <ul style="list-style-type: none"> - Why is it important to evaluate learning pathways? - How did you evaluate learning pathways? - What kinds of data were used? - What did you look for? - Were there any tools available for you?
Data usage	<p>3) The Annual Programme Monitoring Form has specified a few areas for review. I would like to focus on the area of 'curriculum design, learning and teaching'.</p>	<ul style="list-style-type: none"> - Examples: courses grades/attainment, attendance, comments, satisfaction, engagement data, learning pathways, etc. - Did you use Power BI recently introduced by Academic Services? [*If participants were not aware of it, show them.] What is useful about Power BI? What isn't?

	<p>Could you tell me what kinds of data were particularly useful for you when evaluating this area? [Provide sticky notes.]</p>	<ul style="list-style-type: none"> - Were you able to access all the data that you needed to evaluate this area? Was there any data that could be useful but not accessible? - Were you able to use the data available to you to design an action plan to improve the programme curriculum? Could you give me an example?
Challenges	<p>4) Did you encounter any challenges when using data to assess the quality of the programme curriculum?</p>	<ul style="list-style-type: none"> - Costs of time and efforts - Skills - Access to data - Usability and usefulness of data (pedagogically speaking) - Privacy & ethics - Others
Curriculum analytics	<p>[Facilitator shows and explains some images to participants]</p> <p>5) Here is an example of a curriculum analytics tool that shows the pathways of students throughout their degree.</p> <p>Do you find the information useful for evaluating and improving the programme curriculum?</p>	<ul style="list-style-type: none"> - What is useful? Why? - What is not useful? Why? - Is there any other type of data that could be useful to visualise here? How should it be visualized? - To you, how can data visualisation be effective?
Concerns	<p>6) We have talked about various types of data that have already been used or can potentially be used to assess and improve programme curriculum.</p> <p>Do you perceive risks or have concerns about the use of student data for these purposes?</p>	<ul style="list-style-type: none"> - Privacy breach - Surveillance - Potential discrimination of students - Pedagogical concerns - Others
Final remarks	<p>7) Are there any other comments that you would like to make regarding the use of data to assess and improve programme curriculum?</p>	

Questions for Teaching Staff and Personal Tutors

Themes	Focus groups Questions	Prompts
Evaluation activities	<p>1) As part of the internal quality process, programme directors are expected to carry out programme evaluation annually.</p> <p>Could you briefly describe your involvement in the annual evaluation of the academic programme that you teach on?</p>	<ul style="list-style-type: none"> - Were you ask to provide any evidence to support your programme director to complete the programme monitoring form [*show the form]? - What kinds of data did you have to provide? - Do you think the kinds of data collected from you were necessary in terms of evaluating and improving the programme?
Learning pathways	<p>2) Did you take into consideration the different pathways that students take to complete their degree when you design your course or provide support for students?</p>	<p>If no:</p> <ul style="list-style-type: none"> - Why not? - Could it be useful in any way? <p>If yes:</p> <ul style="list-style-type: none"> - Why is it important to evaluate learning pathways? - What kinds of data did you use? - How did you obtain the data? - Were there any tools available for you? - How did you use the data to inform your course offering or student support?
Data usage	<p>3) The Annual Programme Monitoring Form has specified a few areas for review. I would like to focus on the area of 'curriculum design, learning and teaching'.</p> <p>In your view, what kinds of data would be particularly useful when evaluating this area?</p>	<ul style="list-style-type: none"> - Examples: courses grades/attainment, attendance, comments, satisfaction, engagement data, learning pathways, etc. - Are you aware of the tool, Power BI, recently introduced by Academic Services? [*If not, show the participants.] Have you used it personally? How was it useful or not useful to you? - Do you think your programme director has sufficient data to help them evaluate the programme curriculum? - Did the action plans that your programme directors suggested to improve the curriculum seem well supported with data evidence?
Challenges	<p>4) Have you been given any data or analytics tools to help you design your course or student support?</p>	<p>If no,</p> <ul style="list-style-type: none"> - What kinds of data or analytics tool would you find useful? <p>If yes,</p>

		<p>Did you encounter any challenges when using the data or tools?</p> <ul style="list-style-type: none"> - Costs of time and efforts - Skills - Access to data - Usability and usefulness of data (pedagogically speaking) - Privacy & ethics - Others
Curriculum analytics	<p>[Facilitator shows and explains some images to participants]</p> <p>5) Here is an example of a curriculum analytics tool that shows the pathways of students throughout their degree.</p> <p>Do you find the information useful for evaluating and improving the programme curriculum?</p>	<ul style="list-style-type: none"> - What is useful? Why? - Can it help you inform your teaching offering and student support? - What is not useful? Why? - Is there any other type of data that could be useful to visualise here? How should it be visualized? - To you, how can data visualisation be effective?
Concerns	<p>6) We have talked about various types of data that have already been used or can potentially be used to assess and improve programme curriculum.</p> <p>Do you perceive risks or have concerns about the use of student data for these purposes?</p>	<ul style="list-style-type: none"> - Privacy breach - Surveillance - Potential discrimination of students - Pedagogical concerns - Others
Final remarks	<p>7) Are there any other comments that you would like to make regarding the use of data to assess and improve programme curriculum?</p>	

