

# Mapping of the Australian Qualifications Framework Standards onto an undergraduate Bachelor of Pharmacy course

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## Abstract

**Background:** By the start of 2015 all higher education courses in Australia were required to be compliant with a new version of the Australian Qualifications Framework (AQF).

**Aims:** To evaluate the extent to which knowledge, skills and application of knowledge and skills in the Bachelor of Pharmacy (B.Pharm) course meet AQF requirements for a level 8 in-course honours degree, and to determine the effectiveness of this mapping process.

**Methods:** A rubric was developed and validated to map the B.Pharm curriculum against AQF level 8 criteria and the efficacy of the mapping process was ascertained.

**Results:** The mapping process enabled an evaluation of student attributes and recommendations were made in terms of course improvement. Feedback about the process from stream and unit coordinators was generally positive.

**Conclusion:** The tools and strategies developed as part of this mapping process will be useful for others seeking to provide similar information to accreditation bodies regarding the coverage of specific skills and attributes taught, practiced or assessed in their courses.

**Keywords:** *Curriculum Mapping, Australian Qualifications Framework, Bachelor of Pharmacy*

## Introduction

The Australian Qualifications Framework (AQF) is produced by the Tertiary Education Quality and Standards Agency (TEQSA) and prescribes the national standards for higher education qualifications in Australia ((AQF, 2013); see <http://www.aqf.edu.au/>). The AQF incorporates qualifications from each education and training sector into a single comprehensive national framework that underpins national regulatory and quality assurance arrangements for education and training (see <http://www.teqsa.gov.au/>).

AQF level 8 criteria state that a course at this level “qualifies individuals who apply a body of knowledge in a specific context to undertake professional work and as a pathway for research and further learning” (AQF, 2013). This is based on student attainment of knowledge, skills and application of knowledge and skills. Bachelor courses with significant embedded research components can be classified as level 8 and students successfully completing a level 8 Bachelor’s course can graduate with in-course honours.

Audit tools to evaluate skills have been developed for use in tertiary education courses in order to map a course curriculum for a number of reasons. As discussed in Plaza *et al.* (2007), audit tools can identify material taught,

demonstrate links within the curriculum, and examine the curriculum from multiple perspectives (Plaza *et al.*, 2007). Also, curriculum mapping projects are useful for reporting to regulatory agencies such as the Accreditation Council for Pharmacy Education (ACPE) (Kelley *et al.*, 2008). However, many audit tools are primarily content-based relying on information from learning outcomes for particular units within a course or the course itself (Watson, 2002). A course in this instance is a program of study undertaken for the award of a qualification, and comprises many subjects or units. Whilst detailed learning outcomes that are well written provide an idea of skills taught, practiced or assessed in a course, they do not always accurately reflect expected student outcomes and competencies.

The principal purpose of this mapping exercise was to determine the extent to which the Monash Bachelor of Pharmacy (B.Pharm) degree met the AQF requirements for a level 8 course. This information was included in documentation for a self-accreditation process that is auditable by TEQSA, in order to have the B.Pharm accredited at AQF level 8. An additional outcome of this process was to provide information to teaching teams regarding the level 8 requirements for specific units and identify areas for improvement. Our process took into

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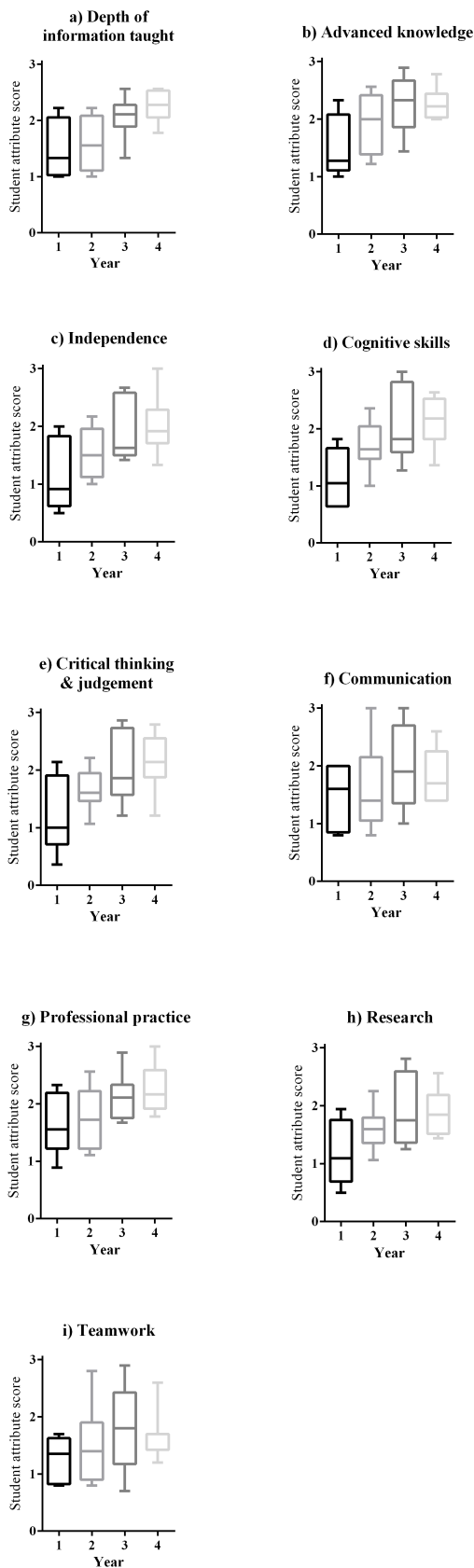
Skills									
Most often seen in ACTIVE lectures as well as tutorials workshops, practical classes									
	Depth	Advanced Knowledge	Independence	Cognitive skills	Critical thinking & judgement	Communication	Professional practice	Research	Teamwork
1. Student establishes role & adapts (in a group?)									
2. Student uses technology to find or generate information									
4. Students practise critical thinking & judgement skills									
5. Students recognise & consolidate information across various disciplines									
6. Student reflects & self manages time & information									
7. Student independently reviews & is able to summarise relevant knowledge									
8. Students are able to frame research questions									
9. Student synthesises new knowledge to create solutions to complex problems with intellectual independence									
10. Students can define context of a set problem & can identify possible solutions									
10. Students are able to manage teams									
11. Student better understands self & others through interpersonal communication & teamwork									
12. Students can effectively communicate to a variety of audiences									
13. Student have the cognitive & technical skills to engage with material to demonstrate advanced understanding									
14. Students are able to design an experimental or investigative strategy for an extended problem or project									

Application of knowledge & skills									
Formative & summative assessment									
	Depth	Advanced Knowledge	Independence	Cognitive skills	Critical thinking & judgement	Communication	Professional practice	Research	Teamwork
1. Students independently select the right approach to a task to obtain a set outcome									
2. Students work independently to plan & execute a project, research or scholarship individually, with non-prescribed deadlines & un-structured goals									
3. When given a task or a problem students plan how to respond									
4. Students identify knowledge & skill gaps									
5. Students take responsibility for closing knowledge gaps/seeking solutions									
6. When given a task or a problem students decide on roles, take leadership positions to achieve stated outcomes									
7. Students take responsibility for their own research direction or scholarship									
8. Students are accountable for their own scholarship & practice									
9. Students collaborate within groups & take responsibility for the successful achievement of the group goals									
10. Students can communicate with a variety of audiences									

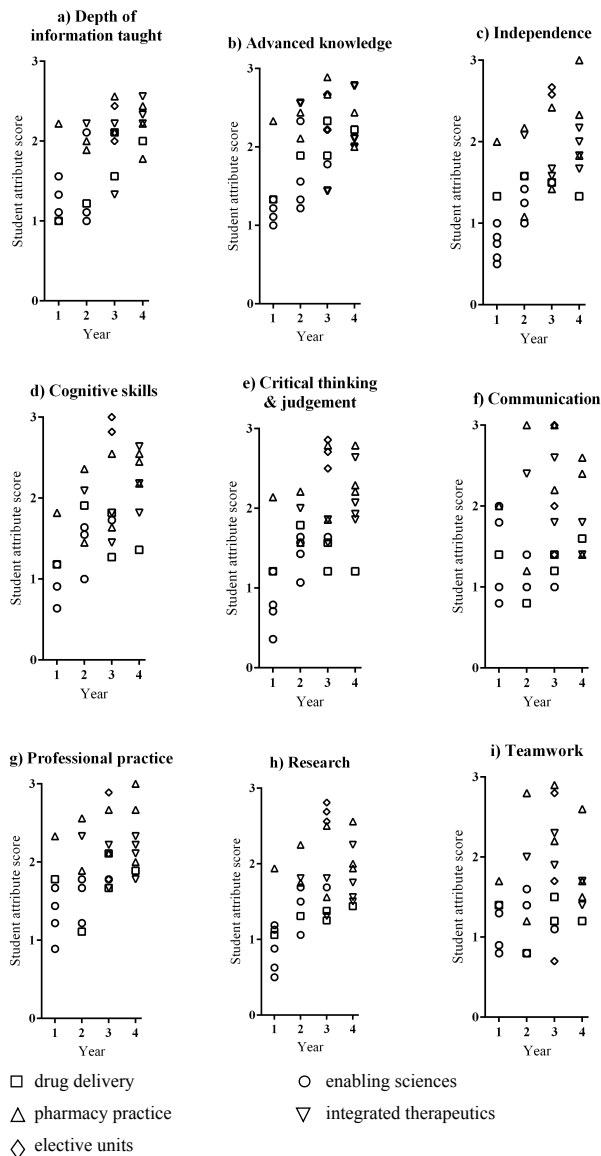
The information obtained from each interview was entered into an excel spreadsheet using the four-point rubric (Appendix 3). Data were analysed and student attribute scores given for each unit for the nine key student learning attributes required for a level 8 Bachelor's course as outlined above (Table I).

Student attribute scores for each learning attribute were presented graphically for each year of the course in which they were taught (Figure 1), as well as in each stream of the B.Pharm course across the years of the course in which they were taught (Figure 2). Individual units were not labelled to protect the confidentiality of the unit teaching teams.

**Figure 1: Box and whisker plots representing attribute scores for each year of the B.Pharm course**



**Figure 2: Attribute scores for each unit of the B.Pharm course divided into the four main streams (also showing the three elective units in 3rd year): enabling sciences, drug delivery, pharmacy practice, integrated therapeutics, elective units.**



A presentation was made to the four stream coordinators and the Course Director that outlined the mapping process and the quantitative results obtained for each unit. Unit coordinators were sent a summary of the quantitative values for their unit, along with the average values for the year level of the unit (1<sup>st</sup> to 4<sup>th</sup> year), and unit type (enabling sciences, drug delivery, integrated therapeutics or pharmacy practice), as well as the rubric used to calculate these values. Where scores were lower than the year level and/or stream averages, potential explanations were included. Unit coordinators were given the option of more specific information regarding their unit if required, and three out of 22 unit coordinators requested this

additional information. Only three of the 41 values for one unit were disputed, and these were appropriately corrected.

### Evaluation of the adequacy of the mapping process

Stream coordinators completed a survey concerning the usefulness of the AQF mapping process. All four stream coordinators completed the survey, and participated in a follow-up interview with an independent observer. All 22 unit coordinators also completed a survey designed to assess the usefulness of the AQF mapping process. The study was approved by Monash University's Human Research and Ethics Committee (Reference #2015001447).

## Results

### AQF mapping: general results

Data were extracted to determine the extent to which the B.Pharm course at Monash University met AQF level 8 standards. Figure 1 shows the nine key student learning attributes necessary for meeting level 8 requirements of the AQF, presented as averages for all units of the B.Pharm course. Student attribute scores for each unit were calculated based on the values obtained using the AQF Attribute Mapping Rubric (Appendix 3). Depth of information taught, advanced knowledge, independence, cognitive skills, critical thinking and judgement, professional practice and research all progressively increased from first to fourth year (Figure 1). Communication and teamwork were more even across each year of the course. Enabling science units tended to have lower student attribute scores, whilst pharmacy practice, integrated therapeutics and elective units tended to have the highest (Figure 2).

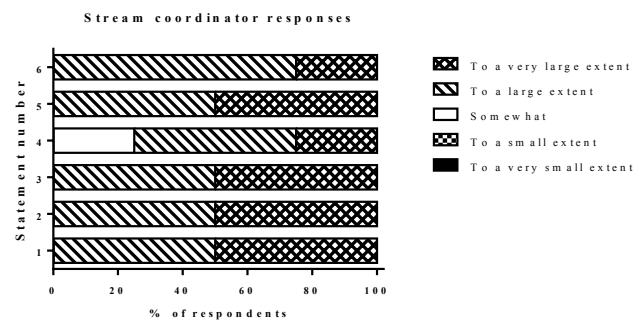
### Perceptions of stream coordinators

A survey of the perceptions of, as well as the satisfaction of stream coordinators with the AQF level 8 mapping process (Figure 3) indicated that the stream coordinators found it very helpful in:

1. Determining the extent to which the level of knowledge and understanding expected in this course met AQF requirements for a level 8 in-course honours degree.
2. Determining the extent to which the skills covered in this course met AQF requirements for a level 8 in-course honours degree.
3. Determining the extent to which the *application of knowledge and skills* expected in this course met AQF requirements for a level 8 in-course honours degree.
4. Identifying gaps in the *knowledge and skills* covered in the B.Pharm course.
5. Identifying gaps in the *application of knowledge and skills* covered in the B.Pharm course.
6. *Better aligning the B.Pharm* course with AQF level 8 standards.

In a follow-up interview with the stream coordinators, it was revealed that they were all clear about the purpose of the exercise, as the open-ended comments show (Appendix 4), for example: "Overall I thought the exercise was extremely well conducted and was useful for identifying activities that met certain requirements, or identified where particular skills/knowledge were lacking".

**Figure 3: Summary of how helpful stream coordinators found the AQF level 8 mapping process in:** 1. Determining the extent to which the level of knowledge and understanding expected in this course met AQF requirements for a level 8 in-course honours degree. 2. Determining the extent to which the skills covered in this course met AQF requirements for a level 8 in-course honours degree. 3. Determining the extent to which the application of knowledge and skills expected in this course met AQF requirements for a level 8 in-course honours degree. 4. Identifying gaps in the knowledge and skills covered in the B.Pharm course. 5. Identifying gaps in the application of knowledge and skills covered in the B.Pharm course. 6. Better aligning the B.Pharm course with AQF level 8 standards.



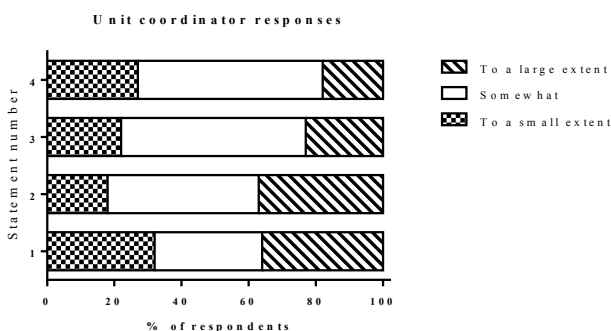
### Perceptions of unit coordinators

A survey of the perceptions of unit coordinators as well as their satisfaction with the AQF mapping exercise sought to:

1. Identify how well key attributes related to *knowledge* (e.g. advanced knowledge, depth of information taught), are covered in the course units;
2. Identify how well key attributes related to *skills development* (e.g. communication, teamwork, cognition), are covered in the course units;
3. *Revise coverage of knowledge and skills* covered in the course units; and
4. *Better align the units to meet AQF requirements* for the B.Pharm degree.

All 22 surveys were returned, and they revealed a wide range of impressions (Figure 4) as discussed in the following section.

**Figure 4: Summary of the satisfaction of unit coordinators with the APF mapping exercise in 1. Identifying how well key attributes related to knowledge are covered in the course units; 2. Identifying how well key attributes related to skills development are covered in the course units; 3. Revising coverage of knowledge and skills covered in the course units; and 4. Better aligning units to meet AQF requirements for the B.Pharm degree.**



### 1. Coverage of key attributes related to knowledge in this unit

Responses to this question, on a three point Likert scale, were evenly spread. Several unit coordinators saw the mapping exercise as very valuable in several ways; including helping identify gaps in their unit, as demonstrated by the following comment: *“The ability to deconstruct the unit to flag appropriate alignment to objectives and where there were deficits was very useful”*.

However there were also unit coordinators who thought that the data gathering process did not adequately cover what happened in their unit as comments (Appendix 5) such as the following suggest: *“Chemistry is not just a collection of facts to be memorised... In addition to the lectures, students are required to do extensive outside on-line reading of the “Virtual Textbook of Organic Chemistry” and work through the accompanying problems. There are also tutes and workshops where they develop and test their understanding of the material”*. For this unit, the resources mentioned in this comment were taken into account when quantifying unit scores.

### 2. Coverage of key attributes related to skills development in this unit

As the open-ended remarks indicate (Appendix 5), unit coordinators were generally pleased with the exercise as it offered them opportunities for a more critical look at the alignment of the unit with AQF requirements, and also served to help them affirm that they were on the right track: *“Spending an hour or so thinking about a range of skills and how they are taught assessed etc. was very revealing. Then seeing how that played out in a semi-quantitative manner was useful as well”*.

However, as suggested by the following comment, there were disagreements over the ratings. In this case for instance, it was a difference of opinion about what should be in or out, which is best resolved at the course team

level: *“... There is currently little/no development of communication and teamwork skills. I personally think that these would overcomplicate the unit and dilute its effectiveness in ingraining a solid understanding of the chemistry basics”*.

### 3. Revising coverage of knowledge and skills in this unit

The majority of the respondents (12) felt that revising coverage of knowledge and skills in their unit might be somewhat possible. Reasons for this general uncertainty around the value of the AQF mapping exercise for course design and curriculum renewal have probably less to do with the robustness of the process itself, but more to the existing general good health of the units as they are, and to the ongoing efforts of unit coordinators.

Generally, respondents saw the mapping exercise as robust and useful in pointing out what might need their attention in the future, if not now, as suggested by the following remark: *“The best aspect of the mapping process was the questioning methods used. In all cases (1 to 4 here) the process was able to dissect the material to determine how it mapped to knowledge, skills and then link this to the AQF requirements”*.

### 4. Better align units in the B.Pharm to meet AQF requirements

While the intrinsic value of the mapping exercise in improving course quality was clear, the overall purpose of the mapping exercise and more importantly its implications for course design and curriculum renewal (including how this might be prosecuted at the unit and course levels), was not fully understood and appreciated by some: *“...I’m presuming this means a particular aspect was marked down b/c journal articles were NOT used? So, I could then find some way of including journal articles to satisfy this requirement, but at the moment I’d be doing it just to tick this box and not with the idea of benefiting the students”*. This comment also reflects a lack of insight as to why it is important to include peer-reviewed journal articles as sources of reference rather than just relying on textbooks or databases where knowledge is already distilled.

However, while the above was true for some unit coordinators, this was by no means an overall perception. There were unit coordinators who saw significant value in the exercise for pointing out what needed to be done where, and in some cases, unit coordinators were very clear about how they will engage with the mapping process (Appendix 5), such as the following comment suggests: *“This unit focuses on the fundamental knowledge which is linked to understanding, and reasoning behind pharmaceutical practices ... and products ... . The linking between knowledge and relevance in practice were not integrated well previously. Improvement will be made in this area to better align and meet AQF requirements”*.

## Discussion

The primary purpose of the work reported in this paper was to ensure that the B.Pharm at Monash University met the AQF requirements for a level 8 course. This involved mapping AQF standards for a level 8 course onto the B.Pharm curriculum in order to ascertain how adequately it was meeting those requirements. The success of this work is in its ability to identify where specific knowledge and skills were taught, where skills were practiced and where application of knowledge and skills were assessed in the course. Evidence derived from the process was used in a submission to the University in order to obtain level 8 status for the B.Pharm degree.

The mapping of generic skills in undergraduate courses has increased in the last decade or so, as the demand has grown for evidence of courses delivering generic skills to improve student learning, develop employability skills and prepare students for lifelong learning (Harden, 2001; Sumsion & Goodfellow, 2004; Tariq *et al.*, 2004; Robley *et al.*, 2005; Britton *et al.*, 2008; Spencer *et al.*, 2011). While there has been some evidence of processes for accreditation (Rønsholdt & Brohus, 2014; Milton, 2014), there are no reports specifically concerning mapping to AQF requirements. This is the first attempt at documenting the process of mapping a course for AQF level 8. The purpose of this publication is to describe both the process and evaluation of the process, as well as make available the mapping tools developed so that this may assist others in determining whether a course meets level 8 AQF requirements (see Appendices 2 and 3).

AQF level 8 differs from AQF level 7 in the language used in describing attributes such as theoretical knowledge and cognitive or communication skills (AQF, 2013). AQF level 7 describes the level of these attributes as “well-developed” or “broad” as opposed to AQF level 8 which describes these attributes as “advanced”. We interpreted the gaining of advanced knowledge and skills as being apparent if there was a progression of these attributes throughout the course, as this indicates building of these attributes to the advanced stage, and therefore past that expected for AQF level 7. This was the rationale for displaying these attributes across the four year levels (as seen in Figures 1 and 2). Student attributes increased from year 1 to year 4 indicating the growth and development of student attributes as a student progresses through the course.

Many of the student attributes (in particular research and independence) appear to peak in the third year of the course. This is not surprising as in third year, one of three research based electives is selected by students, and these electives involve a considerable amount of working on a specific research project. It is interesting to note that communication and teamwork were more evenly spread across the years of the course. This may be because there is a second year unit that focusses on improving the communication and teamwork skills of B.Pharm students. Also, communication is assessed to the greatest extent in second and third year units that contain objective structured clinical examinations (OSCEs). There is a

focus within the course to teach, practice and assess communication skills in second and third years because of the importance of developing the high quality communication skills that are required of pharmacists by potential employers and the public alike. However, this data lends support to the introduction of an OSCE in the 4<sup>th</sup> year of the B.Pharm course to improve the assessment of communication skills (as well as other skills such as critical thinking) in the final year. As of 2015, there are OSCEs at the end of 4<sup>th</sup> year to assess such skills.

The four point attribute mapping rubric used to score each unit (Appendix 3) was developed from AQF level 8 descriptors (Appendix 1) and by following the process of what meeting each outcome would “look like”, as has been suggested previously for the development of rubrics (Luft, 1999). In order to obtain relevant information from teaching teams, an interview process was chosen over other modes of obtaining information such as an online or emailed survey. This method was chosen mostly so that the teaching teams could discuss and agree upon answers to ensure that the information obtained was as accurate as possible. In addition, it has been reported that face-to-face interviews generally yield high cooperation and low refusal rates, allow for longer interviews and have high response quality (Brinkmann, 2013). An interview process with teaching teams using questions created from AQF level 8 descriptors (Appendix 2) should provide more accurate information, as it has been shown that leaving interpretation of words up to survey participants can lead to unintended or incorrect interpretation (Schober *et al.*, 2004). Indeed, we believe this process yielded reliable data, considering only one unit coordinator disputed three out of the 41 values given to one unit. An attempt was made to explain to teaching teams the importance of the accreditation process, but there was some resistance to meeting for such an event, predominantly because of teaching and research commitments by academic staff. This was also why interviews were held to minimise valuable time taken up by staff members in this process. As has been reported previously (Sumsion & Goodfellow, 2004; Spencer *et al.*, 2011), the process of interviewing enabled teams to reflect on their teaching and recognise both examples of good practice within their unit and areas for improvement.

The strength of this mapping process lies within the validation of the data collated. In only two out of the 34 units were there any disputes from unit coordinators regarding the student attribute scores assigned to each unit. The more positive comments from the stream coordinators compared with unit coordinators may reflect their greater knowledge of the importance of AQF mapping with regards to justifying in-course honours within the B.Pharm degree for accreditation purposes.

From a stream coordinator’s perspective, the process delivered quantifiable outcomes that assisted in showing how the B.Pharm course mapped against level 8 AQF criteria. This process enabled stream coordinators to see the progression of knowledge, skills and application of knowledge and skills relevant to AQF level 8 in their



particular streams. This is evidenced by all stream coordinators agreeing “to a large” or “to a very large extent” on a five-point Likert scale with five out of the six statements regarding how helpful they found the AQF mapping exercise (Figure 3). In addition, comments also reflected satisfaction from stream coordinators regarding the mapping process.

A number of unit coordinators seemed defensive and disappointed with the scores observed for their units. Some comments from unit coordinators seemed to be focused on providing a justification as to why certain attributes in their units received a low score. In addition, some unit coordinators wrongly perceived that obtaining low scores reflected a lower importance of their unit within the B.Pharm course, despite being informed on several occasions that every unit was not expected to score highly in every attribute. This highlights the importance of clearly communicating and reminding participants the underlying purpose and intent of the mapping process.

The majority of negative comments came from unit coordinators of units that did not score highly on various attributes, in particular enabling science units. Whilst it is true that the first year enabling science units (primarily chemistry and physiology subjects) exhibited the lowest scores, this does not mean that the information contained within these units is any less important than in units that scored highly. This is something that should have been more clearly explained to unit coordinators. Whilst low scores on these AQF level 8 attributes certainly does not diminish the value of the information covered in the earlier units in the course, it has been suggested that there is a symbiotic relationship between the development of generic skills (eg communication and problem solving) and the development of discipline knowledge and skills (Bath *et al.*, 2004). However, the nature of AQF level 8 attributes means that units more aligned with the pharmacy profession that occur later on in the course are more likely to get higher scores than enabling science units such as organic chemistry, where the direct relevance to pharmacy practice is less obvious. Nevertheless, improving AQF level 8 attributes in these units is something to be considered.

One limitation of this audit was not consulting students, thus the information gained is entirely from the perspective of the teaching teams. As has been discussed previously, this may mean that the student experience is different from that expected by the teaching teams (Bath *et al.*, 2004; Spencer *et al.*, 2011). One aspect that would have improved the audit process was to shorten the timeline between collation of data and dissemination of results to Stream and Unit coordinators. Because the dissemination of results was approximately 6 months after the initial meetings with the teaching teams, a number of Unit coordinators had to be prompted regarding what we were trying to achieve regarding the audit process.

### Concluding remarks

The focus of this curriculum mapping exercise was to collect data from stream and unit coordinators on the mapping of AQF standards for a level 8 course for the B.Pharm course at Monash University. This paper describes the mapping process, the perceptions of participating staff and their satisfaction with the process. It is hoped that the tools and strategies developed as part of this process will be of use to others wanting to provide evidence to accreditation bodies of skills and attributes taught, practiced or assessed in university courses in general, and for B.Pharm courses in particular.

All appendices are available upon request from Daniel Malone (email: [dan.malone@monash.edu](mailto:dan.malone@monash.edu)).

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