

## ***Really, what does it mean to study?***

Exploring the study practices and beliefs of what constitutes valid studying of Pharmaceutical Chemistry amongst BPharm students.

Eleonora D Goosen  
Faculty of Pharmacy  
Rhodes University

### **1. AIM**

Pharmaceutical Chemistry is a compulsory subject for BPharm students. The WHO (World Health Organisation) and the FIP (International Pharmaceutical Federation) also sets global pharmacy standards that are, amongst others, summarised in the concept of an “Eight Star Pharmacist” (Everard, et al., 2006). One of the eight stars is to be a life-long learner, which can be enhanced by acquiring productive and successful study habits.

There are high entry requirements for the BPharm degree, but despite that, students find it hard to adjust to pharmaceutical chemistry in the second year of the curriculum. A number of them still fail despite spending many hours studying.

Although there are many contributing factors to student success, this study specifically created a space for students to speak and provide insight into their study beliefs and practices when studying Pharmaceutical Chemistry.

### **2. METHODOLOGY**

Phenomenography was used as a theoretical framework for this qualitative study. It has been used by several researchers to describe the perceptions and perspectives of chemistry students (Burrows & R, 2017) the education of medical students (Stenfors-Hayes, et al., 2013) and understanding diversity in large classes (Woollacott, et al., 2014). It has also been used to describe distinctly different ways of experiencing different concepts, phenomena and perspectives that students have of studying and learning with different depths of awareness and beliefs about studying. (Akerling, 2008) (Ashworth & Lucas, 2000), Marton as cited in (Drew, et al., 2001).

Semi-structured interviews were conducted with seventeen student volunteers doing second and third-year pharmaceutical chemistry as part of their BPharm curriculum. Ethical clearance was obtained from the Rhodes University Ethics committee with project number 0424. The duration of the interviews was between 10 and 58 minutes. They were taped and transcribed verbatim by the author. Each participant was asked a few open-ended questions with the understanding that they could speak as freely as they wanted about the topic. The information obtained from the interviews was analysed and grouped into different related categories and hierarchies.

### 3. OUTCOMES

The seventeen interviews contained a rich set of data that is impossible to give justice to in this short report. Four of the significant concepts that emerged from the study are highlighted in Tables 3-1 to 3-4. The results in Table 3-4 indicate a hierarchy of study techniques used by different participants. Examples of participant responses in the different categories are indicated in italics.

**Table 3-1 Why did you take part in this study?**

<b>I want to help</b>	<i>"just to try and help other students."</i>
<b>I want to help and learn</b>	<i>"I wanna see if my method of studying is as effective as I think it is and if there is a way that I can improve it,"</i>
<b>I need help</b>	<i>"Because I've been struggling."</i>
<b>You, the lecturer, needs to understand us.</b>	<i>"I think it's very important that you lecturers find out how we learn because after all you're teaching us and we are the ones that take in the information so how you teach, yes that's important, but how we learn that's also equally important if not more important also."</i>
<b>We need to work as a team, and students feel alienated.</b>	<i>"It sounds like a very transformative initiative that like a teacher is very concerned about students and how they really feel because we are, we are the ones that go through this all day, we are the ones that experience all of this, so you trying to understand us from this other side. Right now, where we are, you are just talking to students, it feels like its two different people. Whereas we're supposed to like be in the same page supposed to be like working towards the same thing."</i>
<b>No-one has been interested</b>	<i>"No-one has ever asked me about how I study."</i>

**Table 3-2 The roles of relationships.**

<b>Teachers / Lecturers</b>	<i>There were times when I wanted to give up, but because I had built a very good relationship with my science teachers, they would like "listen you're probably doing it wrong" ..... I started like doing extra work... and I saw the results of doing more." "I would always go to Ms Sewry. I would always go to her"</i>
<b>Tutors and demonstrators</b>	<i>"She basically went through every slide, and she explained everything." "I would go for extra tuition, and that helped a lot."</i>
<b>Fellow students and friends</b>	<i>"I would like go like for example, say we have a group, and we're meeting at this time..... but sometimes it doesn't work because it is usually like with my friends and them and they maybe want to chat and that, whatever, and it doesn't work. But if its people that I don't know, for example during the (pharmaceutical chemistry) workshops, and then say I was sitting with a friend but also with someone I don't know, and whenever someone wouldn't understand something, then I would be like ok, that's how it's done, and also they would explain it back to me, so I think one learns best by actually teaching other people." "They come to you the day before a test or exam, and then they stress you out because they want to know what was done in the whole semester, yeah, they do that."</i>
<b>Family</b>	<i>"My mom's actually a maths teacher, and so then she always believed that past papers helped a lot and also my aunt and uncle."</i>

**Table 3-3 Has anyone taught you how to study?**

<b>No</b>	<i>"I think I developed my own things."</i>
<b>Yes</b>	<i>"I know Ms Sewry said we need to like make sure that we up to date with the work, and that we also need to practise, we need to do a little bit every day, that's what she said." "My mom's actually a maths teacher, and so then she always believed that past papers helped a lot and also my aunt and uncle."</i>

**Table 3-4 How do you study?**

<b>Memorisation "in my head."</b>	<i>"I'd basically go through the slides, and make sure if there's anything I need to remember, I try to remember it, but I try to cram it. When I go through, I just say it in my head: this is what happens when. Usually I don't go to the library during the final day, I read in my room because I have to say it out loud, this happens, this happens, that's what I do."</i>
<b>Memorisation without understanding</b>	<i>"When I'm cramming, I don't understand what is happening I just see what is there, but I know when I'm faced with the same problem, I'll know what to do because I've seen it, but when a problem comes in a different dimension, I won't be able to answer it." "I'm trying to like keep it in my mind like I saw, like what I saw I don't have to understand why it happens, but I just have to know exactly what it is, so I feel like when I keep on saying it, it's not like I get to understand it, but it's there in my mind I don't have to search for it."</i>
<b>Writing and repeating for memorisation</b>	<i>"A friend said the only way to remember and study structures is repetition and that's when I started repeating and writing things out, and that is how I started doing that. so I think I like I like to go through stuff about five times, every day once and then I can pretty much do it off by heart."</i>
<b>Practising for understanding</b>	<i>"I find I also went back to my old chemistry textbooks for that and I started doing a lot of exercises and that helped a lot so now I understand the stuff really very well." 'that's when I would take out a lot of past papers, and then I'll practise and practise and practise."</i>
<b>About understanding</b>	<i>"Just reading every slide, and making sure I understand it and why that happens and why that happens.....I didn't have a way to try to confirm that I understand it, because it was organic, so I read and took a gamble. The gamble paid off." "In pharm chem, I feel it's more like, more concentrated.....so we have to have a broad understanding in order to manipulate (apply), so you have to research further." "When I understood the work, I had less to study." "then there was a turning point where I just started understanding everything, and I caught up"</i>
<b>Additional information in order to gain understanding.</b>	Videos, mainly Youtube, textbooks, reputable websites, electronic text books.

It has been humbling to experience the students that came and spoke about their experiences, some with a cry for help, others with passion in their voices and hearts, an eager willingness to share and some with a sense of fun.

Opening up a space where students could speak freely and frankly has changed our relationships. It has added aspects of humanity, heart and spirit without which education to reach each one's deepest potential cannot be reached. (Palmer & Zajonc, 2010).

Although not much information was obtained from the participants about specific beliefs with regards to study practices, one could argue that their study practices could be a reflection of their beliefs. It is interesting to note that those that participated in order to share how they study are also the ones with the broadest range of study practices. The relatively small and narrow range of study techniques employed by the participants is alarming. The hierarchy ranges from different ways of memorisation to understanding and accessing different sources to gain understanding. Some participants were not able to explain how they know that they understand. Others said that they understand the work if they are able to solve problems from old examination papers correctly. However, that could also mean that they are repeating an already known problem-solving method. Another participant said that when he understands the work by listening in class, he does not need to study to get good marks. The meaning of the concept “to understand” is a topic that has lent itself to many debates and will need further investigation. (Bereiter, 2002).

Another topic that students spontaneously shared was how relationships with teachers, family, tutors and friends acted as sources of knowledge, distraction, encouragement or motivation.

The participants’ stories leave one with questions such as:

Are methods of acquiring and building knowledge not maybe as necessary or even more important than the knowledge itself? Are we providing that adequately? Should it not be an integral part of the curriculum? How can it be done? To what extent has our lack of provision of such methods in conjunction, and simultaneously with subject knowledge, excluded our students from accessing powerful subject knowledge? How has that hampered life-long learning?

How do our large cinema style lecture venues alienate and separate us and our knowledge from our students? How can we come closer to them, especially in large classes? How can we foster a sense of being one big team instead of a lecturer up front talking at a class?

This knowledge challenged my perceptions, beliefs and practices as a lecturer. Presumptions have been replaced with facts.

The fact that most of the students have never been taught any study methods specifically for chemistry is an issue that needs to be addressed as a matter of urgency. Chemistry is a subject that is traditionally taught deductively, and as a result, often leads to learning by memorisation.

Two follow-up research projects are currently being conducted. Firstly, an analysis of my teaching practice with regards to teaching for transformation, and secondly, a continued implementation of a broader range of teaching methodologies with integrated and diverse study method activities.

The results of this study speak to exclusionary teaching practices and the necessity of including a more comprehensive arsenal of knowledge production tools as an integral part of the curriculum to unlock access to powerful subject knowledge. It could be used as an essential guide to effective curriculum transformation and design when teaching a relatively large and very diverse student body.

## BIBLIOGRAPHY

Akerling, G. S., 2008. A phenomenographic approach to developing academics' understanding of the nature of teaching and learning. *Teaching in Higher Education*, 13(6), pp. 633-644.

Ashworth, P. & Lucas, U., 2000. Achieving Empathy and Engagement: A practical approach to the design, conduct and reporting of phenomenographic research. *Studies in Higher Education*, 25(3), pp. 295-308.

Bereiter, C., 2002. Chapter 4 The Knowing Mind. In: *Bereiter, C. (2002). Education and mind in the Knowledge Age. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.*

Burrows, N. L. N. M. K. & R, M. S., 2017. Students' perceptions of a project-based Organic Chemistry laboratory environment: a phenomenographic approach. *Chemical Education Research and Practice*, Volume 18, pp. 811-824.

Drew, L., Bailey, S. & Shreeve, A., n.d. *Phenomenographic research: methodological issues arising from a study investigating student approaches to learning in fashion design*. [Online] Available at: <http://www.leeds.ac.uk/educol/documents/00001770.htm> [Accessed 23 5 2018].

Everard, M., Lesko, M. & Wiback, C., 2006. *New tool to enhance the role of pharmacists in health care*. [Online] Available at: <http://www.who.int/mediacentre/news/new/2006/nw05/en/> [Accessed 1 February 2018].

Palmer, P. J. & Zajonc, A., 2010. *The Heart of Higher Education: A call to renewal*. San Fransisco, CA: Jossey-Bass.

Stenfors-Hayes, T., Hult, H. & Dahlgren, M. A., 2013. A phenomenographic approach to research in medical education. *Medical Education*, Volume 47, pp. 261-270.

Woollacott, L., Booth, S. & Cameron, A., 2014. Knowing your students in large divers classes: a phenomenographic case study. *Higher Education*, 67(6), pp. 747-760.