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SOME CHALLENGES OF COLLABORATION BETWEEN ACADEMIC LITERACIES SPECIALISTS AND SUBJECT SPECIALISTS: FRAMING THE DIFFERENCE

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Collaboration between academic literacies (AcLits) specialists and subject specialists is still a significant issue in student support because AcLits practitioners now need to negotiate the advantages of both stand-alone and embedded courses. This paper focuses on some challenges of one such a collaboration between the provider of AcLits courses (the Language Centre) and the Department of Chemistry and Polymer Science at an institution of higher education. The theory of framing (as in Scheufele, 2013) is used to explain some of the frustration experienced during this collaboration. The study also draws on New Literacies Studies in suggesting that student autonomy in constructing knowledge is negated when focus is placed on academic skills that students lack instead of the contribution students can make towards their own learning. Where previous AcLits collaborations have sometimes used the deficit model (Smit, 2012) to measure the impact of interventions, this study attempts to show that the collaboration itself aids deep learning. However, some challenges have to be overcome, of which an important one is the measurement of impact when the deficit model is not used. Whereas ATLAS.ti has often been used to analyse data sets, this investigation opts for open coding to explicate the frames relevant to this kind of collaboration. Analysis of the findings shows that students perceived this collaboration as a valuable learning experience despite all the challenges experienced. The paper concludes by suggesting that identification, explication and management of the challenges of collaboration thus proved well worth the effort.

Keywords: academic literacies, chemistry, collaboration, deficit model, measuring impact

INTRODUCTION

During the past decade of the existence of the Language Centre (LC) at an institution of higher education, support courses to enhance academic literacies (AcLits) have changed significantly from stand-alone courses teaching generic skills to embedded modules in collaboration with subject specialists. As staff member of the LC, I have been involved in the development of courses in most faculties. There is already a vast body of research to suggest that teaching subject knowledge in conjunction with literacies development is more effective than separately (for valuable lists, see for instance French, 2011; Rootman-le Grange & Retief, 2018). This kind of collaboration, however, has many challenges and the present paper uses the theory of framing to explain and address some of them.

The present paper is the third to be published about a collaboration called the pet ionic compound (PIC) project, undertaken between the LC and the Department of Chemistry and Polymer Science. The first (Coetsee, 2017) was about the alignment between theory and practice of AcLits, where the present paper focuses on identifying, explicating and managing challenges between AcLits specialists and subject specialists. It is a discussion of theoretical AcLits concepts connected to collaboration rather than an empirical research study, and only a few examples of coded excerpts are mentioned at the end of the paper. Ethical clearance and institutional funding for the PIC project were obtained in 2014. The five iterations of this collaboration (2014-2018) have been covered under this clearance, but specific institutional permission for individual staff members was not obtained then because it had not been anticipated at that stage that so many challenges would form part of this collaboration. Students and staff members signed all documents coded, however, to give permission for their participation in this study.

One of the embedded modules mentioned above was developed for the extended degree programme as Scientific Communication Skills (SciComm 146) for first-year science and engineering students who have failed to achieve the minimum entrance requirements, but are perceived as having the potential to pass their graduate studies with additional support. Before 2014, the outcomes of the SciComm module included the reception and production of generic texts, genres and general content perceived to be of use to first-year students. This approach had the effect that students often regarded it as ‘add-on’, and therefore irrelevant.

With the development of AcLits theory from skills-based to socialisation into communities of practice (Henderson & Hirst, 2007), more subject-specific texts were included in the offering. Thus, the perception that texts were authentic increased their relevance to students and enhanced the status of the course. Limited collaboration with library staff about searching for appropriate sources for assignments notwithstanding, the module was still stand-alone.

The literature, furthermore, had developed by 2010 in the direction of a dichotomy between autonomous versus ideological approaches to teaching AcLits (Street, 1984). Proponents of the first-mentioned view often equated academic literacy with writing (see for instance Van Dyk & Van der Slik, 2012, although producing texts is still not often assessed by tests for AcLits levels). However, I concur with Bruner and Olson (1998; Halliday, 1994) that writing is basically a tool of thought for making meaning. Thinking strategies, not how to write correctly, are therefore what the LC should focus on at the start of its courses. Also, with Lea (2004: 741), I think that it is problematic to suggest that the academy is a relatively homogeneous culture, the practices of which are easy to learn in order to gain access to and have success in higher education. Text-based approaches have furthermore been replaced by authentic task-based ones (Weideman, 2006).

The complexity of AcLits theory has been compounded in the past few years by development in the direction of dynamic systems theory, which encourages the blending of alternatives and the inclusion of multiple theories. According to dynamic systems theory, borders between theories and frameworks are blurring more and more. This increases the challenges for academics without the theoretical background necessary to understand and manage collaborations. However, because of the limited scope of this paper, it mainly focuses on framing theory.

The module SciComm 146 attempts to support first-year students with the necessary skills and competencies to succeed in their science and engineering studies. In order to achieve the AcLits outcomes of this course, students ideally need to focus on thinking correct scientific thoughts and adequately communicating them by means of appropriate argumentation, integrating information from different sources, and adequate citation. Before AcLits courses were embedded in the faculties, as at other institutions of higher education, texts called assignments or essays were produced. Students, however, continued to question the validity of these genres for science or engineering students.

In this paper, I first introduce the relevant history of collaboration between academic literacies (AcLits) specialist and Chemistry and Polymer Science specialists at this institution, then explicate specific challenges experienced during the past five iterations (2014-2018) of the PIC project, and finally report on the management of these challenges towards optimising student success. The contribution of this article in a journal of language learning specifically is at the level of the differences between paradigms of AcLits and Chemistry and Polymer Science (Gee, 1996, may call chemistry a 'privileged discourse') and the implications of these frames for students and lecturers. The research question it attempts to answer is: Why is it so difficult for AcLits and chemistry colleagues to work together?

CONTEXT LEADING TO COLLABORATION

Forming interdisciplinary communities of practice has not been without challenges for the LC. One of the objectives of this centre is to enable first-year students to improve their academic and language strategies in order to achieve success in their fields of study. Identifying those missing literacy skills that students would have to acquire in order to achieve academic success used to be based on the so-called deficit model. The opposite of this approach is embedding academic skills in the disciplines, as derived from literacies theory (Lea & Street, 2006). This embeddedness (debated in the literature for years, e.g., Carstens, 2013; Boughey & McKenna, 2016) involves a new way of looking at academic skills, making subject knowledge explicit and collaborating with colleagues who still sometimes want to use communication specialists as proofreaders of reports only.

Already in 2007, Jacobs stated that it is only 'through sustained interaction with academic literacy practitioners that lecturers are able to make their tacit knowledge of the literacy practices and discourse patterns of their disciplines, explicit to students'. Although 59 chemistry interventions between 1975 and 2010 were listed by Reynolds, Thaiss, Katkin and Thompson (2012), few successful collaborations between AcLits colleagues and science colleagues have been reported on in South Africa (see, e.g., Manià, Mabin & Liebenberg, 2017).

Explicating theory about academic literacies (see Street, 2005) means that LC staff had to demonstrate to subject specialists that literacy is a social practice; it is therefore not simply about skills, but embedded in perceptions about where knowledge and identity come from.

Framing theory attempts to identify schemes or paradigms according to which the world is perceived and understood. The origin of the theory is usually attributed to Goffman, a sociologist, already in 1974. The way certain phenomena are interpreted depends on the way they are projected, and Goffman uses his frame analysis to explain why things happen the way they do. This study would like to suggest that the frustration caused by the differences between AcLits and chemistry may be explained by the different frames of these subject fields. Framing the superior status of chemistry is rooted in dominance and power, for instance, in a worldview that may marginalise others (Gee, 1996).

Gee and others see students as active participants in the process of constructing knowledge. For course development, for instance, the function of AcLits specialists has therefore changed from developing exercises in workbooks to facilitating student thinking and writing in chemistry or biology. The perception of LC staff previously also used to be that language skills (basic interpersonal communicative skills, according to Cummins) were meant to be acquired during secondary education so that higher education could focus on academic skills (cognitive academic language proficiency, Cummins, 2008: 71-83).

As Scribner and Cole (1981: 236) point out, 'literacy is not simply knowing how to read and write a particular script, but applying this knowledge for specific purposes in specific contexts of use'. This application is sometimes not explicated for students, making it difficult for them to join academic discourse. It is also possible that subject-specialist faculty members have not been trained in the 'unpacking' of this kind of specialist knowledge. Communication specialists such as AcLits staff members may therefore be ideally situated to facilitate these applications of embedded knowledge.

Benefits of collaboration between AcLits specialists and subject specialists include students becoming more aware of the purposes of academic writing. For science students specifically, topics for writing mostly need to be perceived as relevant to their future careers. Where, previously, students had to produce generic assignments for this course, now, scientific reports and experiments would probably enhance the value of the tasks for students.

Disadvantages of collaboration include possible frustration for students and LC staff members, leading to the necessity for a mediator between, in this case, chemistry and literacies specialists. This mediator or coordinator needs to be cognisant of both fields as well as able to manage change, seeing that collaborative practice needs to develop over time. Miscommunication may lead to frustration and uncertainty, as demonstrated later in this paper.

FRAMING THE COLLABORATION

The theory of framing is usually used in sociology or media studies. The way it is used by Scheufele (2013) was applied in this study to explicate some of the challenges experienced during collaboration. Some of the value of this paper therefore lies in the insight gained by unpacking the differences between AcLits and chemistry contributing to frustration and miscommunication. I suggest that awareness of these frames may lead to better collaboration and enhanced student success.

Although intercultural communication theory warns against the 'othering' of those different from 'us', this paper attempts to use the differences in frames between chemistry and AcLits as a way to explain the challenges experienced during a collaborative project. Despite the different frames of literacies and science, language can also be seen as 'discourses that frame disciplinary content' (Jacobs, 2007: 876). It is a tool and not separate knowledge that students need to master.

Extended degree programme students may find chemistry challenging for different reasons, many of which are connected to its framing. Chemistry, like most other physical sciences, is hierarchically or vertically orientated (see also Rootman-Le Grange & Retief, 2018), meaning that students need a thorough understanding of previous concepts before they can move on to more abstract ones. For students with inadequate chemistry knowledge from school, the assumed knowledge at tertiary level may simply be far more than they can catch up with on their own. In practice, students with incorrect or inadequate chemistry teaching at secondary level may need to unlearn certain concepts, and may even have internalised an inappropriate way of studying chemistry (rote learning instead of understanding abstractions).

Cognition-wise, students may furthermore have internalised a dichotomy between language and science. Against the background of framing theory, this may mean that writing words is for them the opposite of writing science symbols and formulae. Writing about science may therefore cause serious cognitive dissonance, while our telling students that writing science is what scientists do may in itself cause reluctance to engage.

Unlike chemistry, scientific communication is horizontally orientated, meaning that genres, languages or skills can simply be added, and students do not need to have mastered previous ones to move on to the next. The basic building block that students need to succeed at during academic writing is the construction of appropriate sentences and paragraphs, for instance. Thinking an appropriate thought is, however, of more importance at tertiary level. Language is simply a tool to communicate one's thoughts. Thinking in the correct way about chemistry (the domain of the subject specialist) and communicating this thought appropriately (that of the SciComm specialist) is therefore what this kind of collaboration should attempt to achieve.

The *framing* of chemistry in the literature makes it clear that it has much higher status than language and communication. Subject specialists therefore sometimes see language as a tool to convey real knowledge, such as chemistry, and use the language of power; the terms outsiders, practitioners and educational developers are used in comparison to insiders and knowers (Jacobs, 2013). If these terms are considered in a practice-based way, though, chemistry can be seen as something students need as a tool, and the way they convey their knowledge is language, a much more important requirement for their future careers.

Another challenge in class is inequality among students, which cannot only be seen in students' different levels of knowledge and strategies, but also in their (in)ability to use information and communication technologies and virtual learning environments (in our case SUNLearn). The scope of this paper, however, does not allow for the inclusion of these separate frames.

An important distinction between chemistry and AcLits as frames is the way that one correct answer to questions is preferred in the hard sciences to various perspectives as result of different interpretations. Science students often prefer the security offered by one correct answer with one reason for the choice. Communication has never promised this kind of comfort zone, making it much more difficult to grade, especially with automated scoring applications.

Students' inability to comprehend the frame of the literacies can often be seen when they get feedback after writing tasks. Although rubrics to assess aspects of tasks are usually very detailed to help students understand what aspects need to be refined, many first-year students are not able without one-on-one consultations to understand why they do not have full marks for structure or style. This challenge is the result of a different frame.

APPLICATION: THE PET IONIC COMPOUND PROJECT

Science and engineering students have widely divergent needs and even subject fields. The main purpose of the AcLits module, namely to empower students linguistically to succeed in their studies, therefore became more and more of a challenge, firstly because more students with a language background other than English were admitted to this institution and also because theoretically the skills-based approach, where it was relatively easy to add a few exercises to develop skills, has become redundant.

The original idea behind this collaborative project, the so-called PIC project, was that AcLits staff members would be responsible for literacies development, but that students themselves would be responsible for the accuracy of the chemistry. The LC teaches process writing, which means that we want students to refine their first draft until their writing is of a much higher quality than it would have been if only one attempt was made for an end product. Students would thus improve their writing and only post it on Google Docs after having responded to our intervention. During continuous assessment tasks, furthermore, authentic examples of students' PIC writing were used for their peers to edit. I regard these as a more appropriate assessment method than generic multiple-choice questions. However, some AcLits staff members experienced this approach as challenging because there were different correct answers to questions. It is true that inter-marker reliability is challenging when there are six colleagues with different language backgrounds and almost no chemistry knowledge.

Cooperative learning was a strong focus for both the outcomes of AcLits and Chemistry and Polymer Science. First-year science students often do not have a clear objective for obtaining chemistry knowledge. They sometimes do not think they will need to write up experiments or research, or work in groups in industry. In the literature, however, literacy is seen as comprised of a cognitive, a linguistic and a social dimension, of which the last mentioned may be the transformative one (Vieira, 2013).

Although subjects such as chemistry 'privilege specific literacy practices and genres' (Hirst, Henderson, Allan, Bode & Kocatepe, 2004), the LC decided to include reflection on the project. According to Granville and Dison (2005), it is valuable for students to be encouraged to develop meta-cognitive reflective skills 'as a means to enhancing learning and developing higher order thinking'. During the first iteration of this project, the LC identified journaling as a method to achieve this outcome, and we supported students in the, for them, new genre of reflective writing. To prevent them from writing general feedback that would not be useful for any purpose, we provided them with keywords to aid their memory and also reminded them about sub-aspects and themes covered in class (e.g., Bloom's taxonomy). According to the literature, however, because we triggered their memories, this guided journaling could not be used for open coding. Therefore, during the second iteration, we did not use any triggers, which made the students' unsolicited comments less detailed but more useful. Although reflection on what was learnt is not really an outcome of the SciComm module, LC staff believe that mindfulness will help students improve their learning strategies. During the 2017 iteration, however, some students still wrote unstructured paragraphs because proper paragraphing was not specifically stated as an outcome for the task.

FRAMING THE CHALLENGES

The challenges of collaboration need to be identified before they can be managed. This task falls within the frame of AcLits practitioners, and not necessarily within that of chemistry, and may be one of the important contributions of the LC. The purpose of this kind of consciousness-raising paper may also resort under the tasks of AcLits staff, rather than those of Chemistry and Polymer Science colleagues.

Extended degree programme students come with their own challenges, even before collaboration is mentioned. Firstly, the perception that students lack basic writing skills will come as no surprise to anybody in the RSA (or in the UK, for that matter – see Lea & Street, 1998). Neither will the revelation that some science students lack knowledge that they were supposed to have gained at secondary level. For extended curriculum students, this lack may lead to overall failure when they fail their chemistry or mathematics module, preventing them from gaining access to tertiary education again.

Secondly, because the majority of extended degree programme students have to write in English, their second or third language, their fluency and accuracy may need some additional support. This enculturation into academic discourse is partly appropriate and error-free language to express scientific thought and partly a whole new language for scientific purposes (Boughey, 2013).

Thirdly, writing in secondary school is mostly for completely different genres than the reports and articles required by science. Sometimes, it is even necessary to unlearn the informal or journalistic style (characterised by rhetorical questions, quotes by famous philosophers and chatty interjections) taught at secondary level. Some students may thus find it difficult to adapt to the frame of scientific writing.

Finally, for many students, another huge adaptation to higher education is the requirement of accountability in order to show that they are aware of their responsibility when joining scientific discourse. Using appropriate sources to strengthen an argument and citing them correctly is a skill lacking in many school curricula. This is one outcome AcLits specialists have to spend much time on to counter the copy-and-paste culture often allowed at school.

Next, the specific challenges of the collaborative project are identified and explained.

MANAGING THE PET IONIC COMPOUND PROJECT

This year (2018) is the fifth iteration of this collaboration. As can be seen in Table 1 below, fewer students are admitted to the extended degree programme every year. Since 2014, all students in the extended degree programme have had the two compulsory modules: Scientific Communication Skills and Chemistry. They could choose between the Afrikaans and English versions of these courses.

For this project, the role of chemistry staff members was based on a few principles. Students needed to take responsibility for their own learning. Subject specialists did not take responsibility for students' mastering of chemistry; peer teaching was used in order to optimise the benefits of cooperative learning. Individual wiki-style documents were uploaded on SUNLearn (the electronic learning platform), where students in small groups were supposed to correct chemistry knowledge. This means that contact sessions for chemistry were used to teach chemistry concepts in large classes. To encourage students to move towards deep learning and application of chemistry concepts instead of rote learning, the project expected of students to choose individual ionic compounds, so that plagiarism from each other or the internet could be minimised. The above approach by chemistry staff members was sometimes challenging for the LC. Next, the specific challenges of the LC are discussed.

For the past five iterations of this project, the role of the literacies specialists has developed according to our understanding of literacies theory (Boughey & McKenna, 2016). This approach was also the result of the LC's management of the challenges. Because the role of 'language people' is often seen as correcting errors in student writing, the deficit model was used during the first iteration of this project. A rubric was developed, and student writing was assessed using a list of 20 common errors. Counting errors before and after the intervention proved difficult to manage, however, because, as the literature shows, most language practitioners are even unable to agree on what to count as errors (split infinitive?) or how to teach the correct version (see for example Gee's [1996] justification of the utterance: 'My puppy he always be followin' me', as well as be aware of attempts at decolonising Standard English). LC staff also agree with chemistry colleagues that content and coherence are more important than spelling errors. Constructing knowledge in science moreover takes place independently from language errors. Although correct academic language is a prerequisite in the production of texts, writing errors are seen as the inadequate use of a tool. Language as tool to frame cognitive concepts may thus contain errors, but may still create knowledge or communicate adequately.

With rubrics to identify errors, AcLits practitioners raised awareness and helped students take responsibility for their own writing. Then they taught some aspects in class or directed individuals to online sources. The comparison between the first (history of the elements) and final (abstract) writing tasks also helped students and colleagues see which aspects still needed attention. It was found, however, that students generally did not learn from this kind of class feedback, as is supported by the literature.

The second concept that had a part to play in the role of AcLits practitioners for this project was genre-based. If subject specialists provided the content of the project, LC staff could provide format and structure. For the first iteration, the project was called a portfolio, the reason being that short documents were added after specific content was taught in class (e.g., solubility). Students then needed to apply the knowledge to their individual compounds and post their information on Google Docs. However, the choice of the name 'portfolio' was unfortunate, because students' idea about a portfolio excluded our outcome of facilitating coherence between sub-documents.

In response to this challenge, the LC renamed the end product of the project a report. However, because this was not a technical report or the writing up of an experiment, cognitive dissonance was again the result for students and LC colleagues. This kind of report was also not one of our module outcomes. For the second iteration of the project, the project team (at this stage decisions about the project started being made jointly) decided to call the final format a wiki-page. This means that one of the main LC outcomes, namely helping students create coherence, could not be realised.

Another example of genre-based thinking was the decision to have AcLits colleagues not assess the whole project, but only those parts where language played a more important role than, e.g., formulae. Our outcomes related to topic and support sentences, the efficient use of discourse markers and referencing, were therefore realised, for instance. A final abstract was also added in order to help students summarise information for the group presentation at the end of the project.

As Jacobs (2015) states, AcLits specialists are moreover nowadays not seen as genre specialists because they are outsiders to disciplines. Subject specialists use hybrids of genres and sometimes not the genres AcLits practitioners regard as appropriate ones.

Broadening colleagues' definitions of genres, though challenging, may be conducive to better student learning. An example of this is the way the LC used to facilitate presentations. Because science is seen as serious and formal (frame), presentations used to focus on content, not entertainment. Chemistry colleagues persuaded LC staff members, however, that students learn better when challenging concepts are made fun. The final presentations therefore were set up as a boasting session in which student groups competed by making science fun. Students voted for their favourite, not by considering serious characteristics of compounds, but their ability to explode, change colour or be used for space applications.

One more exclusive role which may be considered for AcLits specialists is that of breaking down challenging tasks in order to deal with them more easily. According to Jacobs (2013), explicating implicit subject knowledge may be one of the essential roles of AcLits practitioners during this kind of collaboration. Because subject specialists may not even be aware of the way language is used for their discipline, AcLits practitioners may have to explicate knowledge in order to help students understand challenging concepts.

Another challenge of this collaboration was continuous miscommunication among colleagues and students; therefore, instructions to tasks have been refined and broken down to increase efficient learning and teaching. This refining function was the joint responsibility of AcLits and chemistry coordinators. For the third iteration of the project, we found SUNLearn to be a better learning platform than Google Docs. Changes to the original brief were posted as soon as coordinators became aware of questions or frustration. Where modules used to be separate on the learning platform so that AcLits colleagues could not see the chemistry information, access was granted to the coordinator during the first iteration, and to all six AcLits colleagues during the second one. From the third iteration (2016), a joint project space was created on the platform where students and AcLits as well as chemistry colleagues have had access to all information. This important change may have had a significant effect on the success of the project and pre-empted some of the challenging aspects of the collaboration. Access to important information is also a way in which power in academia is framed, between the Department of Chemistry and Polymer Science and the LC, as well as between lecturers and students.

Managing this change was mostly my responsibility because of the framing of chemistry, which is perceived as fixed and permanent. Joint sessions with chemistry and AcLits colleagues have been organised for the last four iterations in order to clarify some aspects of miscommunication. The initial chemistry information session where the project was explained to students was also attended by AcLits colleagues so that student questions could be managed better.

CODING DOCUMENTS AS METHODOLOGY

Although *framing theory* was used to explicate the challenges of collaboration in a more philosophical way, detail about the challenges experienced was also collected according to Henning's (2004) application of open coding of three student documents (feedback forms, reflective journals and surveys) as well as emails between AcLits lecturers and with chemistry staff members. Collaboration proved to be more difficult than expected. I started with the hypothesis that framing theory could be used adequately to explain some of the communication problems experienced. The widely divergent nature of the frames of chemistry and AcLits was investigated by identifying broad themes. Unfortunately, because of the limited scope of this paper, only a few examples of quotes are discussed. Seeing that an important aspect of the AcLits frame is our being student support-oriented, unlike chemistry, which is a hard science seemingly unaffected by student wellness, the primary texts analysed were student communication produced for AcLits specialists.

Because the brief of the PIC project (see Addendum A) has developed in response to student questions, the survey used to assess whether students understood the instructions has as well. The effect of clarifying the brief and then complicating it again in 2018 can be seen in Table 1 below. (The reason for the discrepancy between column 1 and 2 is the fact that filling in the survey was not compulsory. During the last iteration, one class group did not take part in the survey.)

Table 1: Semi-quantitative responses to survey

Class size	**n =**	**Year**	**Too short**	**Too long**	**Not clear enough**
187	156	2014	33	52	50
151	105	2015	17	19	43
141	123	2016	6	13	8
129	117	2017	3	13	5
118	67	2018	7	14	12

Below are some quotations as reported by coding the open-ended feedback of surveys, student feedback forms, journals and emails. Qualitative coding was done to search for links to the different frames of AcLits and chemistry.

Challenge 1: Communication between the collaborators

During the first iterations, many feedback quotes mentioned miscommunication between the LC and chemistry colleagues. Below, find one example:

> *... the communication between Scientific Communication and Chemistry definitely needs to be improved.* (2014)

Challenge 2: Changing instructions to clarify collaboration

Changing the project brief for every iteration was intended to clarify the requirements of the different modules. Some students, however, still struggled to understand, as can be seen in the following comment:

> *I felt that some descriptions of assignments were unclear as to what was required and it was difficult to see how the assignments related to one another and the project as a whole.* (CK, 2016)

Some students also experienced a (framing?) difference between the instructions for chemistry (tasks 1-3, 9) and the more language-rich tasks (tasks 4-6, etc.), as can be seen in comments such as:

> *I believe that the instructions of the first few tasks can be set out in a different manner, which makes them more understandable.* (MT, 2016)

> *I also learnt to write out hydrolysis reactions for PIC 9, however the instructions were not clear ….* (PP, 2016)

In anecdotal evidence, the theme most often identified as cause for frustration was the fact that instructions to the project were not fixed. To investigate whether students as well as AcLits colleagues indeed identified this development of the project as negative, qualitative answers on module evaluation forms were analysed. The main purpose of student feedback forms is improved teaching and learning. However, by collecting comments on the PIC project, we gained valuable insight into what students regarded as worth mentioning after a year of interventions. The part of these forms that we found most valuable was the qualitative data about what was good and what needed improvement.

> *The direction towards (sic) we are moving should be made clearer.* (Evaluation form, 2015)

Collecting emails and coding them for signs of frustration, but also for AHA! moments, proved useful. (It was unfortunately found that students and colleagues did not often send emails of appreciation to coordinators.) One example of lecturer frustration is included below:

> *Ek het vandag 'n hele klomp onstelde/verwarde studente in my klas gehad. Hulle kom vra almal vir my wanneer moet hulle die abstrakte inhandig, waaroor moet dit gaan, moet elkeen sy eie skryf of moet hulle dit in groepe doen ens.* (Email from chemistry colleague, 2015)

> *Translation* (YC)*: I had a whole lot of confused students in class today. They were all asking me when they have to submit their abstracts, what these should be about, should they all write on their own or in groups, etc.*

Challenge 3: Finding information about compounds

Challenges for some students included the fact that it was much harder to find information about certain chemical compounds than about others. Some compounds do not even exist, and students did not know this before making their choice. A decision was taken, though, to remove all the ionic compounds that do not exist from the 2018 selection, perhaps because the frame of chemistry does not allow for this kind of uncertainty.

> *It [the specific compound] interests me because I did not know of it until the day I was given it but the boring part about it is that very little is written on it as a compound, this makes it very difficult for me to find information about this compound.* (ST, 2015)

Throughout the years, students (like this one in 2018) also mentioned that the project could be improved by *'access to information'*. This perception that searching for information (facilitated adequately by a science librarian) should be easy and straightforward may be part of a science frame where information is easy to find in textbooks.

Challenge 4: Student inability to integrate the modules

Although coding provided some gems about the most valuable aspect of the project, as shown in the first two examples below, some frustrations were also mentioned.

> *... dat hierdie opdrag my die vaardighede geleer het om chemie te kan skryf ....* (2018)
>
> Translation (YC)*: ...that this assignment taught me the skills of how to write chemistry*
>
> *... knowing how to integrate chemistry with english (sic) ....* (2018)
>
> *Although the PIC project is an interesting concept to combine different modules, the additional work load can be overwhelming.* (NH, 2015)
>
> *... I feel that if we did not have to do these tasks, we would have more time to focus on our other subjects, which to me is more important.* (CB, 2015)
>
> *Finding the history of the elements and its industrial uses was not relevant to our study field, however, it helped one to build and develop adequate research skills which will be beneficial as we commence with our studies and also in the work environment.* (Anonymous, 2015)

CONCLUSION

Open coding documents produced by students and lecturers during a collaborative chemistry and AcLits project made for valuable insights. One such insight is that collaboration between colleagues from very different frames will require ample communication before successful student support can be achieved. It would have been possible to retain the first iteration of all the documents provided to students, but then they would not have been supported optimally and some outcomes would not have been achieved. Improving the instructions to the project, survey, and even the format of the final document has helped towards achieving the objectives of this project.

The question whether *framing theory* can be used for this purpose was, to my mind, adequately answered. The different paradigms of chemistry and AcLits indeed cause frustration and miscommunication.

The impact of this project on students' chemistry knowledge and AcLits strategies is hard to measure quantitatively. However, some outcomes mentioned in the coded documents during the project are: deep learning as a result of application of chemistry knowledge, buy-in from students for writing tasks with a clear link to subject knowledge, searching for appropriate sources to answer questions, and writing in a formal and accountable way.

Having identified some challenges during a collaboration between literacies specialists and chemistry specialists (called the PIC project), this paper makes a contribution towards understanding these challenges as well as managing change during collaboration. Frustration of colleagues and students should be managed in order to optimise learning and teaching. Framing theory was used to provide explanations for miscommunication. It is recommended that awareness of differences in approach should be explicated by coordinators to prevent collaborative projects from failing.

An essential implication of this project is thus the management of challenges. This kind of collaboration will not work of its own accord. A knowledgeable coordinator will have to manage (mis-)communication and uncertainty, as well as explicate different frames in a non-threatening way; in short, manage the change necessary to make the collaboration effective. The alternative, for science experts to prescribe to LC colleagues within different frames, is no longer feasible.

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BIOGRAPHICAL NOTE

Ydalene teaches AcLits to first-year students in the Engineering and Theology faculties at present. She has been working in language acquisition for some time but is also interested in the human condition.

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ADDENDUM A: 2018 UPDATED BRIEF TO THE PROJECT

The Pet Ionic Compound Project (PIC project)

The PIC project is an interdisciplinary project that brings together Chemistry, Scientific Communication (SciComm) and Computer Skills. The purpose of the project is for you to experience some of the concepts we will be introducing during chemistry lectures, in a fun and explorative manner. Furthermore, the project strives to provide a context where you can apply and develop some of the vital skills that you acquire in both SciComm and Computer Skills modules.

PIC stands for **P**et **I**onic **C**ompound and refers to the unique ionic compound on which you will conduct your project. As we work through new concepts during lectures you will use the knowledge you gain to gather information on your unique PIC. You should also be on the look-out for traits that may be unique to your PIC, 'things' that make it stand out from the rest of the class. You may even call for an opportunity during a tutorial session to boast about these unique traits. These traits will give you a big advantage during the final presentations of the projects.

The PIC project runs from the second till the fourth term. For each of the assignments you will submit a short report on SUNLearn or through Turnitin. For some predetermined assignments you will submit an additional hard copy of the report to your SciComm lecturer. These reports will be graded according to their rules. You will receive continuous feedback on all your assignments, either from your lecturers or through peer assessment.

At the end of the year each subgroup will identify their PIC that has the most interesting and unique characteristics. Each subgroup will then do a presentation in SciComm on this PIC. From these presentations the SciComm class will identify their favourite PICs to compete in a 'brag'-session where the six subgroups to whom these PICs belong will have the opportunity to battle it out to claim the title of PIC champion.

Since both the presentations and the brag-session will be a group effort, you cannot focus only on your own report. During the year you will also have to oversee and advise on the PICs of your subgroup members, to ensure that one of your PICs stand a chance to win the title.

Questions and support:

For any general queries regarding the PIC project, post a question on the PIC "frequently asked questions" (FAQ) forum on SUNLearn. For queries directly relating to an assignment, contact the appropriate lecturer.
Project coordinator: Mrs. Coetsee (yc@sun.ac.za)
Chemistry related queries: Dr. Pretorius (pretoriusc@sun.ac.za)
Resource related queries: Ms. Theron – faculty librarian (theronm@sun.ac.za)
SunLearn queries: learn@sun.ac.za
An important link that will be useful in completing the assignments for the PIC project:
http://libguides.sun.ac.za/c.php?g=742927&p=5315951

Outcomes:

- that you will experience science as a relevant and everyday phenomenon

- that you will learn to talk the language of science
- that you will understand the importance and position of science in society

Project outline:

Nr.	Assignment/Event	Deadlines
0	**Introduction session**: The project will be introduced and explained in class.	**In class:** 26 March
1	**Individual** Give the formula and systematic name of your PIC. Also pair your cation and anion respectively with any five other cations and any five other anions. You should now have 10 additional ionic compounds which you must name and write the formulas of. We will refer to these compounds as companion compounds in later exercises. Write a coherent paragraph explaining how you went about naming the above compounds, by referring to the rules for naming of ionic compounds. **Responsible module: Chemistry**	**Submit:** 13 April **Peer assess:** 27 April
2	**Individual** Assuming that your PIC and its companion compounds are completely soluble in water, write dissociation reactions for your PIC and at least five of its companion compounds. Also calculate the molarity of the solution if 25.0 g of your PIC is dissolved in enough water to make up a 250 ml solution? Repeat the exercise with each of the five companion compounds identified above. Finally, rank the concentrations of the six compounds from smallest to largest and write a coherent paragraph explaining the outcome of these calculations. **Responsible module: Chemistry**	**Submit:** 11 May **Peer assess:** 25 May
3	**Individual** You will complete a questionnaire on the project description and outcomes. **Responsible module: Scientific Communication Skills**	**In class:** Week of 23-26 July
4	**Individual** Your PIC is made up of different elements: when, where and by whom was each of these elements discovered? Where do the names of these elements come from? Write a summary in which you answer these questions. Word count: 300 words or 1 page. Use at least two academic sources and reference correctly according to the Harvard method. **Responsible module: Scientific Communication Skills**	**Handing in of hard copies:** **First draft:** Lesson 2 of the week of 30 July to 3 August **Final version:** Lesson 1 of the week of 6-10 August **Submission on *Turnitin*:** 10 August
5	**Individual** To compare PICs, you need to collect information about the industrial value of your PIC (What can it be used for?) Write a summary on this topic. Word count: 200 words or one page. Use at least two academic sources and reference correctly according to the Harvard method. **Responsible module: Scientific Communication Skills**	**Handing in of hard copies:** **First draft:** Lesson 1 of the week of 13-17 August **Final version:** Lesson 1 of the week of 20-24 August **Submission on *Turnitin*:** 24 August
6	**Individual** Investigate the isotopes of one of the elements from which your PIC is compiled and use a graph to represent the percentage composition of the natural isotopes of this element. Then focus on only one of the isotopes (natural or synthetic) and give more information about an interesting use or uses of the specific isotope. Word count: 200 words or one page. Use at least two academic sources and reference correctly according to the Harvard method. **Responsible module: Scientific Communication Skills**	**Handing in of hard copies:** **First draft:** Lesson 3 of the week of 27-31 August **Final version:** Lesson 3 of the week of 3-7 September **Submission on *Turnitin*:** 7 September
7	**Group work** In this activity you have to make up a group (maximum 3 students). This group of students will work together on their abstract and final presentation for the PIC project (assignments 9 and 11). Between the three students in the group you have to choose one of your three PICs to use for these activities. The choosing of groups will be facilitated by your Scientific Communication lecturer. All groups should be finalised by 31 August. Write a concise abstract about the most important and impressive features of the PIC chosen by the group. The content of the abstract must be representative of the content of the group presentation (compare assignments 9 and 11). Word count: 250 words. **Responsible module: Scientific Communication Skills**	**Handing in of hard copies:** **First draft:** Lesson 3 of the week of 24-28 September **Final version:** Lesson 3 of the week of 1-5 October **Submission on *Turnitin*:** 5 October
8	**Individual**	**Submit:** 28 September **Peer assess:** 12 October

	Write a hydrolysis reaction for your anion in water. Calculate the pH of the solution that will form if you were to dissolve 25.0 g of the sodium salt of your anion in pure water to make a 500 mL solution at 25 °C. Do you think a solution of the sodium salt of your anion in water will be acidic, basic or neutral? Explain your answer in a short paragraph by referring to your calculations. **Responsible module: Chemistry**	
9	**Group work** Plan and design a PowerPoint presentation in Computer skills. The presentation is based on the information given in the abstract (assignment 7). The PowerPoint slides will be used during the presentations taking place in the week of 15-19 October in die Scientific Communication class (compare assignment 11). **Responsible module: Computer skills**	1 October – 12 October
10	**Individual** Write a reflective report on the PIC project and complete the questionnaire about the project description and outcomes. **Responsible module: Scientific Communication Skills**	**In class:** Week of 22-36 October
11	**Group work** Do a presentation based on the abstract (assignment 7). Make use of the PowerPoint slides as designed in the Computer Skills class (assignment 9). **Responsible module: Scientific Communication Skills**	**In class:** Week of 15-19 October
12	**Brag session** Winning groups from each class will do their presentations in front of the bigger class group.	**In class:** 25 October Winning groups should email their final PowerPoint slides to the project coordinator, mrs Coetsee, at yc@sun.ac.za by 12:00 on 23 October.

ADDENDUM B: PIC PROJECT 2018: REFLECTION ON SKILLS DEVELOPMENT

Dear Student, although your answers to this questionnaire may be used for research, you will in no way be disadvantaged by your individual responses. By participating you acknowledge your acceptance of the conditions to this questionnaire.

Beste Student, hoewel jou antwoorde op hierdie vraelys vir navorsing gebruik kan word, sal jy op geen manier benadeel word deur jou individuele antwoorde nie. Deur die voltooiing van die vraelys bevestig jy jou aanvaarding van die voorwaardes van die vraelys.

Read the PIC project brief and answer the questions below:

Lees die PIC-projekbeskrywing en beantwoord die vrae wat volg:

1. What is your perception of the instructions to this project / *Wat is jou indruk van die instruksies van die projek?*

(a) too short / *te kort*
(b) too long / *te lank*
(c) not clear enough / *nie duidelik genoeg nie*
(d) Other / *ander*

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2. Please indicate your degree of understanding the instructions to the PIC project by marking the appropriate block with an [x] / *Hoe goed verstaan jy die instruksies van die PIC-projek? Merk die blokkie met 'n [x] wat ooreenstem met jou antwoord:*

I know exactly what is required of me *Ek verstaan presies wat van my verwag word*	I will have to read the instructions again *Ek sal die instruksies weer moet lees*	I need to ask a friend *Ek sal 'n klasmaat moet vra*	I need to ask a facilitator *Ek sal my dosent moet vra*	I don't understand this project *Ek verstaan die projek glad nie*

3. Please mark the outcomes that you think this project will develop (You may mark more than one) / *Dui aan watter van die volgende uitkomstes jy verwag om te ontwikkel na voltooiing van die PIC-projek. Jy kan meer as een merk.*

☐ My ability to write chemistry
My vermoë om chemie te kan skryf

☐ My ability to work effectively in a group
My vermoë om effektief in 'n groep te kan werk

☐ My ability to present information in front of a group
My vermoë om inligting vir 'n groep aan te bied

- ☐ My chemistry knowledge from school
  Verdere ontwikkeling van my chemie-kennis van skool

- ☐ My English proficiency
  My taalvaardigheid

- ☐ Other
  Ander

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  ……………………………………………………………………………………

4. I hope this project will teach me the following / *Ek hoop om die volgende te leer tydens die voltooiing van die projek:*

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5. One aspect of ionic compounds that I need help with is / *Een aspek van ionise verbindings waarmee ek hulp sal benodig is*

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6. I plan to do this project with the following attitude / *Ek beplan om die projek met die volgende houding te voltooi*:

   - ☐ With enthusiasm / *Met entoesiasme*
   - ☐ Just because I have to / *Omdat ek moet*
   - ☐ To learn important skills / *Om belangrike vaardighede te ontwikkel*
   - ☐ To get a good grade / *Om 'n goeie punt te kry*

7. Will you be using the process writing approach to complete this project / *Sal jy die prosesskryfbenadering gebruik om die projek te voltooi?*

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8. How do you understand the process writing approach? Explain what the approach is to you / *Hoe verstaan jy die prosesskryfbenadering? Wat beteken dié benadering vir jou?*

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