Leveraging the ALACT Reflection Model to Improve Academic Skills Development in Bachelor Students: A Case Study

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Abstract
Academic skills are essential in most future professions for students, yet frequently receive sporadic or ineffective attention throughout higher education. Therefore, we set out to implement the ALACT reflection model in a second-year academic skills course within the bachelor's program in Pharmaceutical Sciences. The model was applied to both presentation and teamwork skills which are practiced in a relevant academic context. As such, the aim was to improve the timeliness and level of insight students have into their strengths, growth, and points for improvement. The ALACT model is a spiral approach to reflection where students begin with (1) a concrete experience, (2) observing and reflecting, and then (3) forming abstract concepts and generalizations about the experience. These are used (4) to create an action plan which is then (5) enacted. The last step forms the new experience from which the cycle repeats. Previous research suggests that the conscious and consistent implementation of the ALACT model can provide a basis for meaningful self-evaluation and increased competency and confidence. Therefore, we redesigned the month-long course to ensure the five steps were well-integrated and that students would complete the spiral at least twice for each skill. Results from lecturer interviews and a student questionnaire indicate that the intervention leads to increased awareness of existing competencies and steps for improvement, and a very positive view of reflection and its role in skills development. A review of the practical considerations for implementing the ALACT model in academic skills courses within science education is also provided.

Keywords: ALACT, Reflection, Academic Skills, Presenting, Teamwork, Higher Education

Introduction

Employability in almost every field is rarely solely dependent on subject knowledge; academic skills such as critical thinking, teamwork, and presentation skills are also needed to successfully complete complex tasks. However, 51% of executives find that graduates entering their companies have a skills gap (Kenworthy & Kielstra, 2015), only 52% of graduates can effectively solve problems or perform a critical analysis, and just 48% are seen as able to work effectively as part of a team (Chartered Management Institute, 2018). These results are striking, as problem-solving and teamwork are the most important skills for employees today (Kenworthy & Kielstra, 2015). The development of academic skills within universities can therefore aid students in bridging this gap between their university and the professional world (Andrews & Higson, 2008; Dolce et al., 2020; Moore & Morton, 2017; Robles, 2012). Targeted instruction and training are necessary for effective skill development (Cottrell, 2001) but are often lacking as such skills are frequently superficially trained (McLaughlin et al., 2019; Morbitzer et al., 2021; Wu-Pong et al., 2013).

We strongly believe in the importance of explicitly teaching and practicing skills and are always looking for better approaches to skill development within content-heavy curricula. As skills are both versatile and context-dependent, it is logical to teach *how* a skill is learned. This aids students in adapting to new situations after graduation as they will be able to efficiently learn new skills within a professional context. Learning how to learn requires 'self-regulated learning' (Zimmerman, 2000): the ability to regulate aspects of one's thinking, motivation and behavior while learning. Self-regulated learners create meaningful, achievable goals against which they assess progress. An effective way to develop self-regulation is to provide opportunities to practice regulating aspects of their own learning and reflect on that practice (Nicol & Macfarlane-Dick, 2006). Through reflection, students gain the insight needed to correct bad habits and affirm good habits.

In this case study, we describe the implementation of a structured reflection model in an undergraduate academic skills course with the aim of improving students' capacity for self-regulated skills learning. To this end, we chose to work with the ALACT model (Korthagen, 1985) to provide a scaffolded reflection process that promotes self-regulated learning through helping students become aware of their own skill level, learning process, and the actions they can take to influence this.

The undergraduate academic skills course Modern Developments in Pharmaceutical Sciences (MDPhar) was selected for this research, due to its established strong course design, with several opportunities to practice academic skills within a relevant discipline-related context (Bologna Working Group on Qualifications Frameworks, 2004; Rotherham & Willingham, 2010). Student evaluations over the past years also reflected a consistently high satisfaction rate. This offers the possibility to look at one specific adjustment to an already successful course, giving a more precise view of the effect of the implementation of the ALACT model.

The MDPhar course focuses primarily on developing teamwork and presentation skills. We therefore conducted a mixed methods analysis to assess *how students and lecturers experience the implementation of the ALACT reflection model as a tool to support the development of presentation and teamwork skills.* As such, we aimed to contribute to the understanding of how this model can be implemented in undergraduate education. We will begin with a detailed description of the context for the research and the theoretical reasoning behind it before outlining the methods and results.

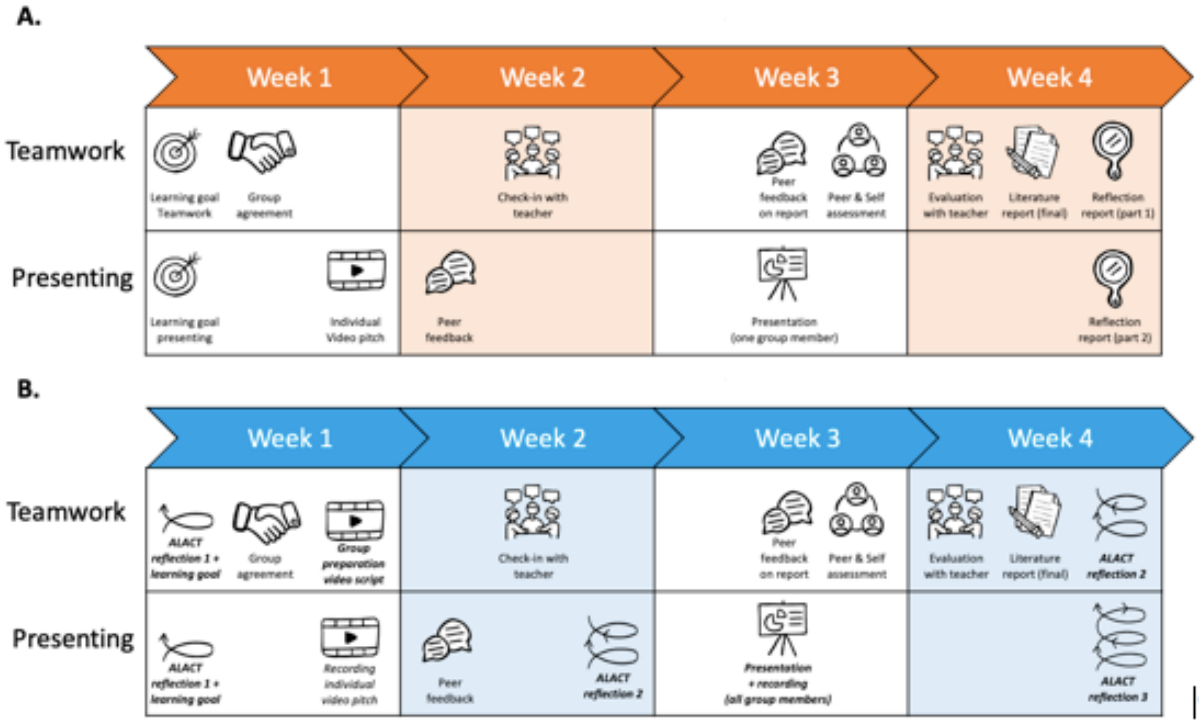
Course overview before ALACT implementation

MDPhar is taught to 50-60 second-year Pharmaceutical Sciences bachelor students at the Vrije Universiteit Amsterdam, the Netherlands. The course lasts four weeks and is situated at the end of the academic year. Students work on a project in randomly assigned groups of three students, and various activities are included to promote skill development, including presentations and reports. Figure 1A shows an overview of the course activities as taught completely online in 2020 and 2021.

In the first week, the students reflected on previous teamwork and presentation experiences using a teamwork competency framework, presentation rubrics, and targeted questions (Braadbaart, Vuuregge, Houtkamp, et al., 2023). Based on this reflection, they formulated personal learning goals for both skills. Each group also wrote an action plan, with division of tasks, group expectations, and work agreements. Students received lecturer feedback on the personal learning goals and the group action plan. During the course, students continued working on their teamwork and presentation skills through practice, peer feedback and check-ins with lecturers. A more extensive description of the course activities in 2020 and 2021 can be found in Figure 1. In the final week, students were provided with questions to reflect on their skill development progress in a report and adjust their learning goals for future practice opportunities.

The peer feedback activities, establishing learning goals, and group action plan were assessed as a pass or fail. The presentations and reports were assessed with grades (1-10) using rubrics (Braadbaart, Vuuregge, Houtkamp, et al., 2023).

Figure 1: Overview of the MDPhar course timeline including the learning activities divided over the two learning lines “teamwork” and “presenting”.



Note. ***A****. The orange overview represents the original course design with learning activities from 2020 and 2021. The teamwork learning progressions centered around writing a literature review. Several online open office hours were organized each week to answer questions. The teamwork was further guided by a 10-minute online check-in moment in the second week. In the third week, each group conducted a peer review of the report*

of another group. Each student also used the teamwork competency framework to perform a self-assessment and provided peer feedback to their group members. During an evaluation meeting with the lecturer in week four, each group discussed the teamwork process, skills development, and the peer feedback on their literature review. In the fourth week, they submitted the final literature review. To practice presentation skills, the students prepared and recorded an individual video pitch in the first week in which they pitched a solution to a relevant scientific question, without slides. Each student received asynchronous peer and lecturer feedback on their presentation skills via the learning management system (LMS) using FeedbackFruits, focusing on argumentation and (non) verbal communication, especially related to their learning goal. Students were instructed on the feedback criteria and how to give good-quality feedback. In the third week, the students prepared a scientific presentation on their literature review using slides. Just before the presentation, the lecturers randomly chose which group member would present to the lecturers and classmates on behalf of the group. The presentation was followed by a discussion with another group and the lecturers. ***B****. The blue overview depicts the redesign of the course in 2022. Changes compared to the original design are shown with bold italic text. The changes relate to the implementation of the ALACT model for reflection throughout the course (ALACT reflection 1-3), and the optimization of the video pitch and literature presentation to support skill practice. The video pitch optimization included preparation of a video script with the group, while still presenting individually. Moreover, the video pitch was connected to the group literature review. For the literature presentation, all group members presented instead of only one as previously. Moreover, the live literature presentation was recorded on video to aid the individual reflection process.*

Research impetus

Student evaluations in 2020 were overall positive. Students indicated through verbal feedback to lecturers, reflective reports, and an anonymous survey (N=19, 39%), that they appreciated the course format, specifically the focus on the active development of their teamwork and presenting skills. Most of the survey participants (89%) agreed that they were "sufficiently challenged to further develop their academic skills". Similarly, most respondents (89%) agreed that they had "received valuable feedback … to improve their work and skills in the future". The lecturers were also very positive about the results and felt that the students were more actively engaged in their skills development.

The pass rates were similar to pre-Covid19 years (data not shown) and the 2021 rerun of this online set-up had similar results. It therefore appears that the teaching of teamwork and presenting skills can be done effectively online. However, the lecturers saw room for optimization of the course setup. Due to the position of the reflection report at the end of the course, the lecturers had the impression that many students did not fully appreciate its usefulness and did not adjust their way of working during the course. The report was also quite extensive, which led to both a high grading workload and incomplete answers due to some questions being skipped. Students also mentioned that they would appreciate more practice opportunities. This aligned with lecturer observations that many groups started collaborating relatively late, probably due to the individual video pitch assignment at the beginning. Additionally, since the literature group presentation was only presented by one group member, two-thirds of the students only had one practice opportunity for presenting.

Theoretical framework

Following the 2021 course run, opportunities for optimization were identified to more consistently engage students in a practice-reflection cycle, thereby reaping the most benefit for their academic skills development. This meant prioritizing the promotion of learning *how to learn skills* by optimizing the links between reflection and practice and offering moments for supported self-regulation.

Towards this end, the ALACT reflection model was selected (Korthagen, 1985). ALACT is an acronym for the five phases within the model, which include *Action*, *Looking back*, *Awareness*, *Create*, and *Trial* and a full description of those phases can be found in Figure 2. The ALACT model has a long history in teacher education, though other fields have also begun to use it in their training. There are only a few examples of this extension of the model, often in the medical sciences (Driessen et al., 2008; Hulsman et al., 2009; Michels et al., 2010) and sport psychology (Hutter et al., 2015). As ALACT focuses on the reflection process rather than the context (Korthagen, 1985; Korthagen et al., 2001), it appears to transfer well to other disciplines. The use of the ALACT model to support reflection has been correlated with a greater capacity for growth and development (Wubbels & Korthagen, 1990), improved quality of work (Syslová, 2019), and increased confidence and competency due to the combination of reflection and practical experience (Hutter et al., 2015).

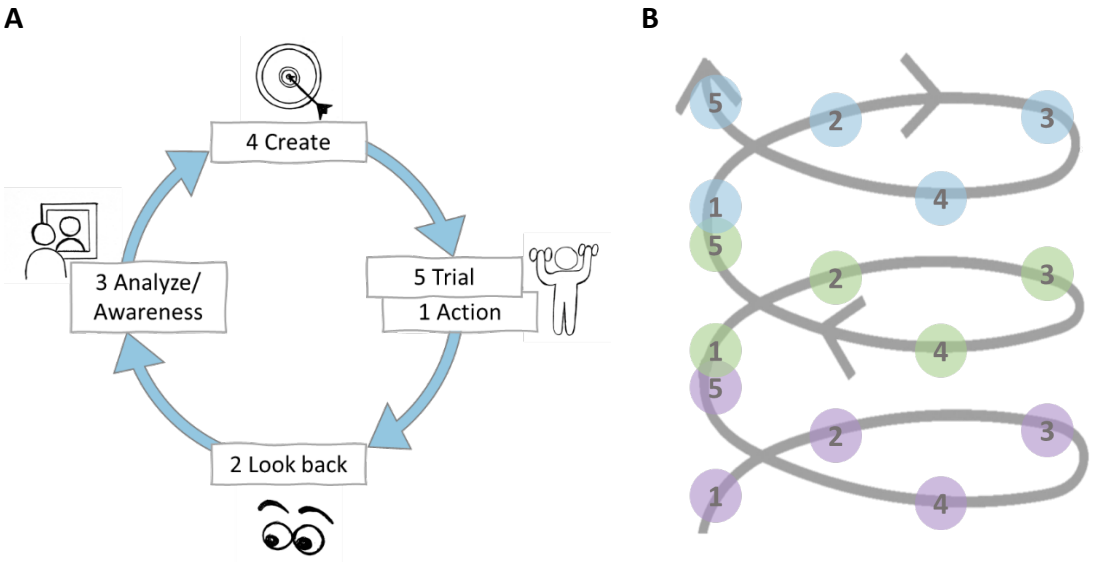
Reflection has been proven to positively impact learning, particularly for the stimulation of 'deep learning' (Hattie & Donoghue, 2016) and is also a reliable self-assessment process (Learman et al., 2008). However, students also often need help to reflect accurately on their experiences (Korthagen & Vasalos, 2005; Lai et al., 2017). Hulsman et al. recommend that in order "to develop a more accurate impression of oneself, the meta-cognitive judgment of one's performance should be accompanied with systematic and intentional elicitations of the views of others" (2009, p. 143). Peer feedback is an effective way to provide the "views of others", and was already implemented within the course (Ambrose et al., 2010; Biggs & Tang, 2011). However, we felt that peer feedback and reflection could be combined more effectively to optimize practice moments, minimize additional lecturer workload, and ensure timely, meaningful reflection on both presentation and teamwork.

The ALACT model is suited to these purposes for several reasons. Firstly, it explicitly acknowledges the role of irrational and emotional factors contributing to behaviors (Korthagen & Vasalos, 2005). Both teamwork and presentation can be emotionally loaded activities: consider for instance a fear of presenting, perfectionistic tendencies, or friction between group members. In contrast, other reflection models such as that of Kolb & Fry (1975) emphasize abstract conceptualization over awareness of other sources of behavior (Matsuo & Nagata, 2020). Korthagen actually highlighted the ALACT model's value in reflecting on collaborative situations and emphasizes the prioritization of reflective thinking as "a fundamental program learning goal before the field-based experience" (1985, p. 12).

Secondly, and perhaps most importantly, the authors recognized the value of a reflection cycle which emphasizes growth stimulated by previous experiences and a repetitive reflection process. Successful reflection is not a discrete task, but an ongoing process that continuously builds on previous experiences (Bruner, 1960; Korthagen, 1985), and thereby leads to continuous improvement, as represented in Figure 2B. We chose to therefore picture the ALACT model not as a circle, as is traditionally done (Figure 2A), but as an upwards spiral (Figure 2B). This conceptualization allowed the lecturers to clearly visualize how students would work through the various 'loops' throughout the course, ensuring that there was alignment between reflection assignments, feedback, and practice moments.

Altogether, we believe that these considerations make the application of the ALACT model to academic skills in undergraduate education a novel and valid extension of the use of the model.

Figure 2: The ALACT reflection model.



Note. ***A****. Representation of the different steps of the ALACT model: Phase 1: Action - Practice opportunity with given skill; Phase 2: Look back on and describe practice opportunity; Phase 3: Awareness of essential aspects; Phase 4: Create an action plan for the next learning opportunity; Phase 5: Trial - practice again with skill. Note: step 5 coincides with step 1, restarting the reflective cycle.* ***B****. Representation of the spiral nature of the ALACT reflection process, where subsequent reflective cycles are interconnected and build on each other, leading to continuous improvement in skill development.*

Redesign to optimize the reflection process

Following this spiral approach to the ALACT reflection model, the lecturers aimed to allow the students to go through the reflection cycle several times for each skill. It was also essential to ensure appropriate scaffolding at each step to support the reflection process in moving beyond merely reporting events (Creemers et al., 2013). Therefore, the frequency, timing and content of the reflection assignments were carefully attended to and two main adjustments were made to include more practice moments for all students (Figure 1B).

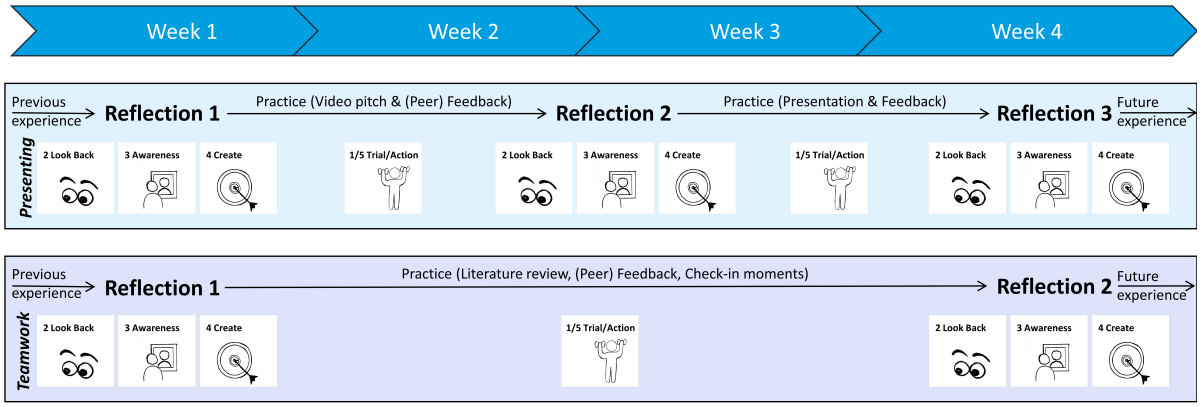
Firstly, to immediately encourage collaboration and working on teamwork learning goals, each group prepared a script for a pitch promoting their literature review to an audience with a general pharmaceutical sciences background. Each member still recorded the video pitch individually to allow for personal practice and feedback on presenting.

Secondly, each group member presented an equal part of the literature presentation, providing all students with a second opportunity to practice their presenting learning goal. This created three reflection cycles linked to presentation skills. A reflection assignment was created for each cycle: (1) at the beginning of the course in formulating the learning goal, (2) after the video pitch, and (3) after the literature presentation (Figure 3). To better support students in the ‘looking back’ and ‘analysis’ phases of the reflection process, all literature presentations were recorded on video. For teamwork skills, only two reflection assignments were included, as lecturers feared that more frequent reflection on collaboration would make it superficial or repetitive. These reflection assignments were positioned at the beginning and the end of the course (Figure 3).

The reflection assignments were constructed using the guiding questions from the previous reflection assignment (Figure 1A). These questions were matched with their respective ALACT phases. Some questions were rephrased and new ones were added to cover all

ALACT phases in each assignment. As such, scaffolding was provided to students not used to this way of reflecting. Students from another sciences bachelor programme were asked to answer a sample of the new ALACT-based reflection questions to further optimize the reflection questions. This resulted in a set of final questions that was presented to students as online question-and-answer quizzes for each assignment (Braadbaart, Vuuregge, et al., 2023a). A simple rubric was created to assess the responses of the students (Braadbaart, Vuuregge, Houtkamp, et al., 2023).

Figure 3: Implementation of the ALACT model throughout the MDPhar course in the final redesign in 2022 as depicted in Figure 1B.



Note. The timeline for reflection activities with respect to presenting are indicated in light blue, whereas teamwork is shown in light purple. Reflection 1-3 refers to discrete reflection assignments with questions related to the indicated phases of the ALACT model. A brief description of the trial/action activities can be found above each horizontal arrow.

Research methods

The research was set up to explore the experiences of students and lecturers with the ALACT model and to identify perceived strengths and weaknesses in the implementation. Three data types were collected: student responses to multiple-choice questions, student responses to open questions, and semi-structured interviews with the three lecturers. All three lecturers are also collaborating authors on this article, inhabiting the role of *teacher-as-researcher* in an action research context (see Babkie & Provost, 2004; May, 1993; Watts, 1985) in which they are active critical inquirers in their own practice (Dewey, 1904).

At the beginning of the course, students were asked for informed consent to participate in the study. 22 out of 47 students consented to participate, of which 15 students started, and 14 students completed the research survey at the end of the course. Statistical analysis of the cohort was performed in R version 4.2.0 via the RStudio interface version 2022.07.2+576. Multivariate logistic regression analysis showed that the gender of the students, their subgrade for the reflection assignments, and their final grade for the course did not significantly influence the odds of giving consent to participate in the study or the decision to fill in the research survey at the end of the course.

Student perceptions of the ALACT model were gauged through a short survey (Qualtrics software) at the end of the course consisting of 5-point Likert-scale questions (Table 1) and four open questions (Table 2), all related to student experience with the reflection assignments and their skill development.

The answers to all open questions were independently coded and cross-checked by two authors using ATLAS.ti software version 22.2.5.0. They used inductive and deductive coding. Inductive coding focused on identifying themes within the data which would not be purely limited to reflection, e.g. feedback, course set-up, teamwork, and improvement of skills. Deductive coding examined the occurrences of each phase of the ALACT model. The deductive coding was checked for completeness, but as the original independent inductive coding sessions led to overwhelmingly similar conclusions, the validity of the codes and intercoder reliability were immediately evident.

All three *teachers-as-researchers* were invited for individual semi-structured interviews to explore their experiences with the ALACT model and the use of reflection in the course (Braadbaart, Vuuregge, et al., 2023b). Due to the different experience levels of the lecturers, the aim was to provide space for both novice and expert opinions, reflection on the various iterations and growth of the course, and contributions to the narrative of the research. The interviews were transcribed verbatim and edited for readability. They were coded inductively as well as deductively. Inductive coding resulted in two themes: course design choices and lecturer perceptions of student feedback, actions, or skill level. Deductive coding was based on the lecturers' use of the ALACT phases in their responses.

All teachers have a vested interest in the outcome of the work, though have endeavored to remain appropriately skeptical about the limitations of the research, as is discussed in the results. The initial student survey results were known, and it is clear that the lecturers were both pleasantly surprised by the feedback and still able to analyze potential explanations for various results.

Results

The results of the student surveys and lecturer interviews showed a cohesive picture with two key findings: (1) the ALACT model can be a useful tool for academic skills development, and (2) the structured process is highly suitable for guiding reflection in bachelor students. Each finding will be further elaborated below, followed by a brief overview of the points for improvement that emerged. See Table 1 for an overview of the Likert-scale survey item results mentioned within the text. An overview of the survey open questions can be found in Table 2.

ALACT reflection model as a useful tool for academic skills development

Initially, lecturers reported a need for a clearer focus on skills education with attention for teaching, practicing, and receiving feedback on skills. This was based on their own observations but also on direct reporting from students in-person or in course evaluations. The results show that the choice of the ALACT model facilitated the realization of this goal. Amongst students and lecturers alike there was an overwhelmingly positive view of the usefulness of reflection in developing academic skills within the revised course set-up.

When asked for their opinion about skills-reflection, almost every student mentioned areas relating to improved awareness of essential aspects and improvement of their skills. This was also reflected in the multiple-choice questions, where students overwhelmingly reported sufficient *support* in improving their skills (see statements 2, 3, 5, and 7 in Table 1). Interestingly, while students felt challenged to improve their presentation and teamwork skills (100% and 71% in agreement respectively; statements 1 and 8), only 53% for

presentation and 14% for teamwork felt their skills had improved (statements 4 and 11, respectively). This can potentially be attributed to the very short length of the course: students were provided with the right tools, but not enough time or a conducive teamwork situation to make large gains. In both presentation and teamwork, students agreed that they had developed an awareness of *how* to improve their skills (93% versus 79%; statements 6 and 10, respectively). In the open questions, a strong majority highlighted aspects of presenting as one of the most important things they learned with regards to skills.

Additionally, student comments further support the appropriateness of the ALACT model for skills education. Students noted that they "found it a very nice way to guide their development step-by-step" and that by reflecting on their skills "it becomes clearer what you should work on and how successful you can be by working on it". A common worry of the lecturers, particularly Lecturer B, is that student buy-in would be low. However, even if the initial impression is less than favorable, students still saw the value. As one student memorably stated:

> *I find it quite useful; reflection assignments seem useless, but they aren't actually. You learn a lot by reflecting on your presentations, but also by observing what you like when someone else is presenting. You can really improve yourself by doing this.*

In the survey, over 90% of students agreed that *the course helped them reflect more and more deeply on improving their skills than in other courses where these skills are addressed* (statement 14) and the same amount agreed that the course *has given them a better idea on how I can continue to improve my skills in a focused way in the future* (statement 13). This suggests that the ALACT model can be an effective way to teach students how to learn new skills. Among all open questions, a majority of the student responses were coded as demonstrating "awareness of essential aspects" (phase 3). This also indicates the depth of reflection: students were not just providing general answers or recalling what they had done, but providing detailed, specific answers about key concepts and ideas they would take with them – a desirable outcome for any course.

The lecturers also were generally positive about student performance, particularly in the students' active engagement with their learning goals and progress, as Lecturer C highlights:

> *The level of reflection will naturally differ per student. It's not like [the assignments] were all top quality. But I did have the impression, from conversations with students and also in reading the reflection assignments, that the students were just much more consciously working on their [skills].*

The lecturers also experienced the reflection assignments as much more focused and "on-topic" than previously. Moreover, they received positive verbal feedback from students regarding reflection and the extra attention to developing academic skills, especially in comparison to other courses.

Structured reflection using ALACT provides appropriate scaffolding for undergraduate students

When implementing the ALACT cycle, the lecturers focused on providing as much structure as possible. ALACT can be used as a tool to teach reflection, and the results support this scaffolded, step-by-step approach, even with second-year undergraduate students. Judging

from their responses in the survey, students were very appreciative of the repeated, spiral reflection versus "only at the end". They also found the assignment set-up accessible "due to the fact that there were separate questions you needed to fill in, and not an entire report". The scaffolding and repetition were valued and rarely seen as an extra burden. 100% of students completing the survey agreed that the course set-up should remain the same for next year (statement 15), and the open question responses mirrored this, with specific praise for the spiral design. For instance, one student says, "I was challenged to think about my learning goal and its development before, during, and after the literature assignment and presentation". Another appreciated that:

> *...you were required to think carefully about your skills, and also received feedback on this from both the lecturers and your peers. That way you heard how your skills were viewed by others. It was also good to set a learning goal because you actually go and work on it.*

Lecturer A noted that using a structured course set-up encourages students to "work much more actively [on their skills] … this improved the buy-in from students." Having a meaningful, structured set-up can therefore contribute positively to student engagement, particularly with activities such as reflection which students might traditionally find 'boring' or unmotivating.

Another interesting observation which supports a strongly structured set-up is how often students mentioned elements from ALACT phases 3, 4, and 5 in their responses to the open questions. Students were clearly being supported to move beyond "basic" reflection as many of us know it, which usually encompasses only phase 2: looking back. Students had clearly engaged in a more critical, action-focused form of reflection where they assimilated feedback, identified essential elements for success, and then proceeded to trial and assess different implementations. They frequently indicated the usefulness of peer and lecturer feedback in supporting their awareness of strengths and weaknesses, highlighting that implementing ALACT is strongly supported by ensuring these sorts of scaffolding activities at key moments in the reflection cycle.

The lecturers were also positive about the use of such a structured approach to reflection. A reoccurring theme was how the set-up helped make the students' learning "visible" (Hattie, 2009) throughout the course – not just at the end. Lecturer B highlighted that this also provides the student with "the space to improve within the course". In addition to space for improving, Lecturer C pointed out that students also learn *what* to improve: "all those phases seem very good in exposing what is actually important in order to be able to take the next step and continue building on that." This can also be attributed to the frequent feedback moments from peers and lecturers. And while feedback can be intimidating for students at first, the lecturers noted that it frequently boosts students' confidence. This was reflected in the high number of students reporting how helpful it was, because this "gives you a better view of your own skills". Students also reported "secretly actually enjoying presenting" and realizing "that I can actually present quite well just by preparing differently". While teamwork remained less central in the responses from students, lecturers did find that the team feedback moments and check-in's provide space for more difficult conversations.

Points for improvement

The structured use of ALACT was largely viewed as a positive experience, yet several points for improvement were also noted by lecturers and students. Although respondents generally agreed (79%, statement 12 in Table 1) that the reflection questions were clear, a few students mentioned in the open questions that there were redundancies in the reflective questions. The lecturers also agreed that these can be simplified in the future; as this was a pilot, the lecturers opted for questions which were as thorough as possible. Both students and lecturers found that the response length could be restricted, as some students wrote very little and others far too much. Next year approximate word counts will be provided. Nevertheless, only 14% of the students found the questions unclear (statement 12, Table 1) and many students were satisfied with the reflection assignments and would not change anything.

The lecturers noticed two elements for improvement that were not flagged by students. First, they were unsatisfied with the online tool used for the assignments as a workaround was needed to grade holistically instead of grading all questions separately. In general, we advise that lecturers carefully consider not just workload for students, but also time allocated for lecturer grading and ease of use of any grading system (Scholten et al., 2021). Secondly, lecturers also noted that additional support in creating learning goals could be advantageous as many students struggled to identify goals which were achievable in four weeks.

Lastly, many students noticed that the presentation line had three ALACT cycles while teamwork only had two; according to them, this led to the idea that teamwork skills received less attention and that they also had less insight into their teamwork skills development. In sharp contrast to presentation skills, where students were generally enthusiastic about what they had learned, only few students noted takeaways related to teamwork. These were primarily neutral – "I've learned how important a good collaboration is for good results" – or obviously linked to frustrations such as "in order to improve your teamwork skills, it is helpful if your group members are motivated for the project, which was not always the case for my group members" and "I realized that I find it difficult to raise issues when the collaboration is not going as it should".

We identified three possible reasons for this. Firstly, teamwork only had two cycles. This is due to the nature of teamwork and the shortness of the course. Lecturers originally thought that providing another reflection moment after just two weeks of working together would feel quite superficial. The check-in moments were used instead to keep an eye on the collaborations. The lecturers were pleased with the collaborations this year and found that there were fewer issues than in previous years. However, they are considering including a brief intermediate reflection moment or space to role-play common difficult situations. Secondly, it seems that students need more support to create actionable teamwork learning goals as compared to presentation goals. Even with lecturer feedback, many students struggled to create a learning goal (phase 4) which was concrete enough to be able to practice on in four weeks and also relevant for themselves and their team. Lastly, it must be acknowledged that teamwork is a complicated, longitudinal phenomenon that is more difficult to isolate into specific actions for success, as can be done with presenting. It therefore seems less likely that clear, concrete progress is made in just four weeks.

Table 1: The 5-point Likert scale student research survey questions including means, standard deviations (SD), and number of respondents (N).

#	Survey statement	Likert Scale	Mean	SD	N	Negative (%)	Neutral (%)	Positive (%)
1	In this course, I was sufficiently challenged to improve my presentation skills	Agreement	4.73	0.44	15	0	0	100
2	Preparing and recording the video pitch provided sufficient opportunity to develop my presentation skills	Agreement	4.27	0.68	15	0	13	87
3	Preparing and conducting the literature presentation provided sufficient opportunity to develop my presentation skills	Agreement	4.53	0.5	15	0	0	100
4	To what extent do you feel your presentation skills have improved during the course?	Extent	3.73	0.77	15	0	47	53
5	The reflection assignments (incl. questions, setting a learning goal, reviewing presentation recording, peer feedback) gave me a better understanding of the level of my own presentation skills	Agreement	4.29	0.45	14	0	0	100
6	The reflection assignments made me more aware of what and how to improve my presentation skills	Agreement	4.29	0.59	14	0	7	93
7	In this course, I had plenty of opportunities and chances to practice my collaboration skills	Agreement	3.79	0.77	14	7	21	71
8	In this course, I was sufficiently challenged to improve my collaboration skills	Agreement	3.79	0.77	14	7	21	71
9	The reflection assignments (incl. questions, setting a learning goal, peer feedback) gave me a better understanding of the level of my own collaboration skills	Agreement	3.64	0.89	14	7	43	50
10	The reflection assignments made me more aware of where and how I could improve my collaboration skills	Agreement	3.79	0.67	14	7	14	79
11	To what extent do you feel your collaboration skills have improved during the course?	Extent	3.07	0.7	14	14	71	14
12	To what extent did you find the questions in the reflection assignments clear?	Level of clarity	4.07	1.03	14	14	7	79
13	This course has given me a better idea on how I can continue to improve my skills in a focused way in the future	Agreement	4.43	0.62	14	0	7	93
14	In this course I reflected more and more deeply on improving my skills than I usually do in other courses where these skills are addressed	Agreement	4.64	0.61	14	0	7	93
15	The current format in the course to encourage skill development (incl. video, peer feedback and reflection assignments), should be used again in the course next year as far as I am concerned.	Agreement	4.5	0.5	14	0	0	100

Note. The scale for each question is indicated in the second column. For example, the scale "Agreement" ranged from Totally disagree (1), disagree (2), neither disagree, nor agree (3), agree (4), to totally agree (5). The scale "Extent" ranged from Not at all (1), little (2), somewhat (3), considerable (4), to very much (5). The column "Negative" represents the percentage of responses where respondents selected any of the lower two ("1" or "2") Likert scale options (e.g., (totally) disagree), The column "Neutral" depicts the percentage of

respondents selecting the middle option in the scale (e.g., neither disagree, nor agree). Finally, the column "Positive" represents the percentage of the respondents selecting the upper "4" or "5" options of the Likert scale (e.g., (totally) agree). Note: this is an English translation of the original Dutch version of the questions used in the survey.

Table 2: The student survey open questions 16-19 with the number of respondents for each question (N).

#	Survey question	N
16	What did you like about the design of the course in encouraging skill development (incl. learning goals, video recordings, (peer) feedback and reflection assignments)?	14
17	What do you think could be improved in the course design with respect to stimulating skill development?	11
18	What do you think about reflecting on the development of your own skills and briefly explain why.	14
19	What is the most important thing you have learned in the course in terms of skill development (for example, think of eye-openers)?	14

Note. These last questions were open questions to allow students to highlight specific details of the skill development during the course. Not all students had points of improvement to stimulate skill development, highlighting the general positive attitude of the students towards the implementation of the ALACT model for skill development. Note: this is an English translation of the original Dutch version of the questions used in the survey.

Conclusions

The current work demonstrates a successful extension of the ALACT model by implementing it in an undergraduate academic skills course to optimize both practice and reflection. The aim was to create a more structured and effective process of developing presentation and teamwork skills to support self-regulation while maintaining an acceptable workload for lecturers and students. Our results show that we were successful in achieving this goal: both students and lecturers found that the structured spiral set-up provided sufficient support for meaningful reflection and also effectively stimulated skills development. Due to this perceived usefulness, the ALACT implementation also seemed to promote student buy-in. This is a positive side effect in a student population generally not appreciating such activities. The implementation method also appears to stimulate reflection beyond simply 'looking back' (phase 2). Students frequently mentioned positive aspects of the reflection approach that related to the later ALACT phases: they reported that they were more conscious of elements needed for success (phase 3), and better able to translate these into concrete actions (phase 4) for subsequent practice opportunities (phase 5). Several points for improvement were also identified, which include ensuring minimal redundancy in reflection questions and the need to address the disbalance in the development of presenting versus teamwork skills. For example, it seems students need more support in creating actionable teamwork learning goals.

Taken together, the ALACT model can be a useful tool for promoting skills development within higher education, though steps should be taken to ensure that the implementation provides sufficient scaffolding and that the spiral nature is used. Discrete reflection moments should therefore be consistently linked to subsequent practice opportunities throughout the learning process. Moreover, lecturers planning to use this model should be careful to ensure that the balance between scaffolding and workload remains practical, both for students and lecturers (Scholten et al., 2021). Lastly, the scaffolding should be adapted to the amount of experience students have with reflecting.

In the future, these initial successes could be more thoroughly explored. Firstly, to investigate if the perceived improvements also translate to actual improvements in both reflection skills and the academic skills being taught. Secondly, application to other academic skills would

aid in further illuminating the potential of this approach. Thirdly, there is also value in corroborating the positive experiences with those in other educational settings. Lastly, this was an exploratory study which examined many facets: total course design, reflection skills, inclusion of peer feedback, and of course the academic skills themselves. More in-depth exploration of each element can therefore also contribute to our understanding of how the ALACT model can be successfully implemented within an academic skills curriculum.

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