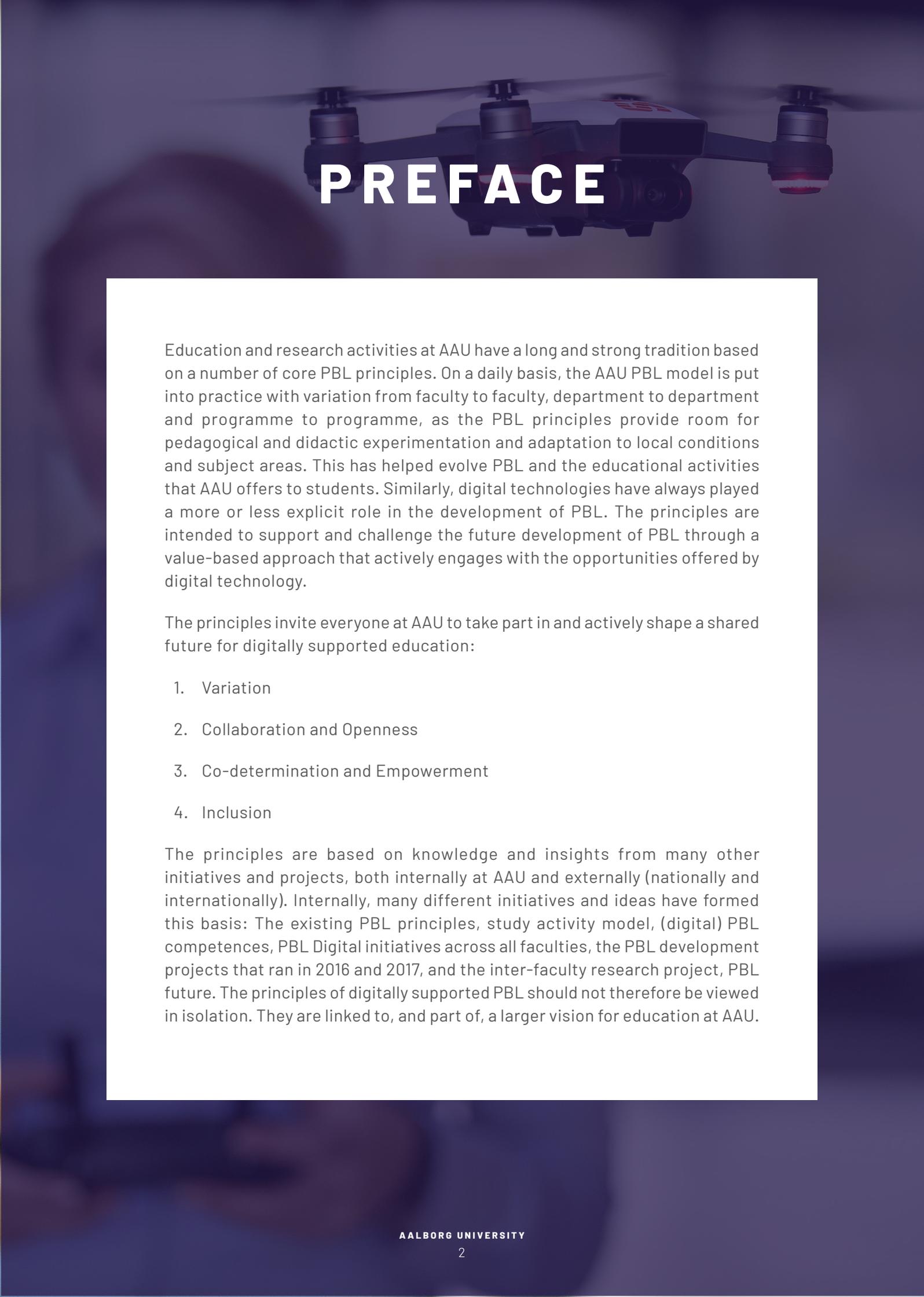


PRINCIPLES FOR DIGITALLY SUPPORTED PBL



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PREFACE

Education and research activities at AAU have a long and strong tradition based on a number of core PBL principles. On a daily basis, the AAU PBL model is put into practice with variation from faculty to faculty, department to department and programme to programme, as the PBL principles provide room for pedagogical and didactic experimentation and adaptation to local conditions and subject areas. This has helped evolve PBL and the educational activities that AAU offers to students. Similarly, digital technologies have always played a more or less explicit role in the development of PBL. The principles are intended to support and challenge the future development of PBL through a value-based approach that actively engages with the opportunities offered by digital technology.

The principles invite everyone at AAU to take part in and actively shape a shared future for digitally supported education:

1. Variation
2. Collaboration and Openness
3. Co-determination and Empowerment
4. Inclusion

The principles are based on knowledge and insights from many other initiatives and projects, both internally at AAU and externally (nationally and internationally). Internally, many different initiatives and ideas have formed this basis: The existing PBL principles, study activity model, (digital) PBL competences, PBL Digital initiatives across all faculties, the PBL development projects that ran in 2016 and 2017, and the inter-faculty research project, PBL future. The principles of digitally supported PBL should not therefore be viewed in isolation. They are linked to, and part of, a larger vision for education at AAU.

INTRODUCTION

IDEAS UNDERPINNING THE PRINCIPLES

In working on the principles for how digital opportunities can support PBL, it is important to emphasise that AAU already rests on a number of institutionalised principles for PBL, as well as a teaching and educational praxis that has been developed over many years. The intention is not that principles for digitally supported PBL should replace or operate as a parallel track, but rather:

- The principles should challenge and expand upon existing principles and strategic actions
- The principles should inspire and open up new possibilities
- The principles should be considered for the development of “next practice”
- The principles reflect a value-based approach to work on the digitalisation of education

An important premise for the principles has been that, in many ways, AAU is and has been digitalised for a long time. Most aspects of higher education are already intertwined with, and permeated by, digital technologies. Partly in the form of institutional platforms such as Moodle and Panopto, but equally because many lecturers and students work creatively to incorporate digital technologies into teaching and project work. Digital technologies are thus already interwoven with teaching and learning practices, and are a prerequisite for the overall educational ecology and infrastructure.

A HYBRID AND INTERWOVEN REALITY

The principles of digitally supported PBL are based on a reality where physical and digital practices evolve together, leading to new hybrid formats and opportunities. The hybrid aspect not only concerns the merging of physical and digital spaces, but should also be understood as new combinations of, for example, education and the outside world, internal and external collaborations, formal and informal learning. This hybrid reality is a basic premise upon which informed pedagogical and value-based choices must be made. In doing so, the principles must be linked to, and grounded in, a broader value base and context for education.

A VALUE-BASED APPROACH

The principles reflect a value-based approach to the digitalisation of education, focusing on how digitalisation can support and strengthen core organisational and pedagogical values. The principles should thus be read as guidelines that can guide the work on digital support for education and training for study managements and boards, coordinators, lecturers and students. They should help challenge and explore new opportunities to support and reinforce existing pedagogical values, so that digitalisation can help make education even more student-centred and engaging, more varied, more inclusive, more open and connected. The principles should be understood as an opportunity to ask new questions that focus on pedagogical and organisational values rather than on the technologies themselves. The principles

suggest that we shift focus from asking questions based on the technologies, "How do we implement Teams?" or "How do we make the best use of Moodle?", to asking questions such as "How do we use digital technologies to increase variation in our programmes?" or "How can digital technologies support a more inclusive teaching and learning environment?".

FROM DIGITALISATION OF TEACHING TO DIGITALISATION OF EDUCATION

When we at AAU have worked with digitalisation in recent years, this has particularly focused on teaching activities in individual courses and guidance in connection with project work. Similarly, existing PBL principles capture and describe the practice and organisation of problem-oriented project work, while the study activity model has a focus that revolves around courses and project work within the framework of a semester.

With the principles for digitally supported PBL, AAU wishes to challenge and expand the existing framework for digitalisation and draw attention to other levels of education that AAU can incorporate more actively when working with digitalisation. Digitalisation should not only be thought of in relation to individual courses or project work. Digitalisation can challenge how study boards, semester coordinators and lecturers design and organise individual semesters, the links between semesters and activities within a study programme, as well as the relationships between lecturers and students. But also how programme leaders can think outside the university's discrete courses (interdisciplinary projects, for example) as well as university's relations with the outside world. Here, digitalisation opens the door for AAU to start working with different modes of organisation and relations than we are accustomed to, as well as on different scales for courses, projects and, not least, interdisciplinarity. We have attempted to illustrate these levels in Figure 1 (see next page).

The description of the principles focuses in particular on course level, semester level and programme level. This is to clarify which actors are involved (lecturers/students, semester coordinators, study management) and to make the principles more concrete.

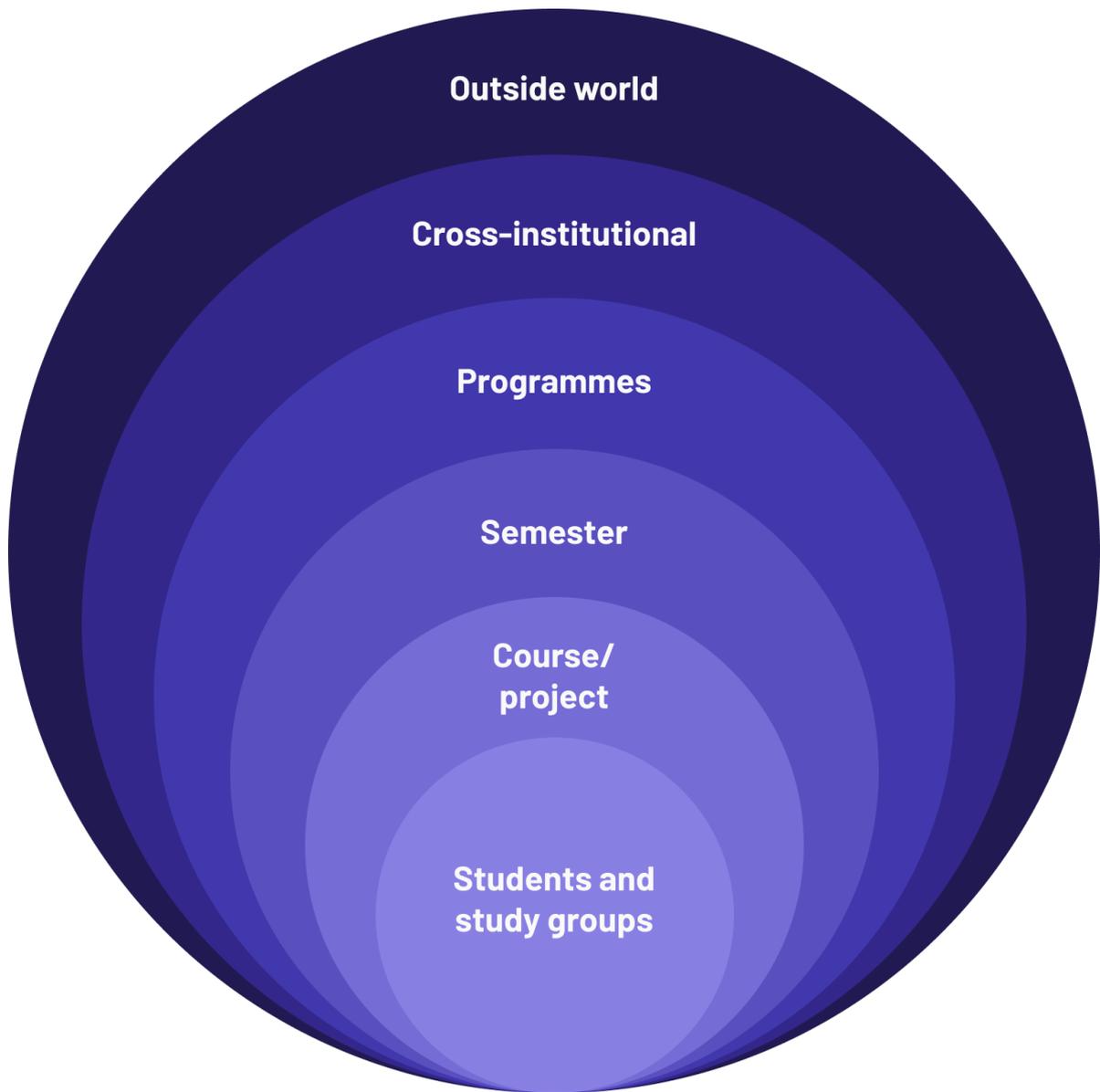


FIGURE 1



THE 4 PRINCIPLES

1. VARIATION

Variation as a principle challenges and extends existing PBL praxis. Variation, understood as both within and beyond the different levels of the programmes, aims to ensure that students experience a wide variation in teaching and project work throughout the programme. The principle proposes that study leaders, study boards, coordinators, lecturers and students consider variation as an essential principle in the organisation and practice of education and teaching. Students are motivated and learn in different ways, so variation can benefit all students through multiple approaches to learning, teaching and education. In this context, the digital can help widen the scope of educational opportunities and support variation as a principle at multiple levels of practice.

At the course level, digital technologies can help create variation by applying different tools such as quizzes, digital post-it-boards, in-class brainstorming, or including digital resources such as videos or podcasts for preparatory work. Resources which can subsequently underpin the project work. Variation can also be realised in different forms of participation, where learning can take place online or as asynchronous activities (e.g. online discussions). It can also be manifested in more multimodal forms of assignment submission or work on digital portfolios.

At the semester level, digital solutions can facilitate restructuring parts of the semester's more knowledge-based learning activities into digital resources, allowing for different relations between courses and project work. Focus can be shifted from lectures to facilitating discussions between groups and the lecturers/supervisors, where a deeper dive into a particular theory can benefit the projects.

At the programme level, variation can mean students encountering varying semester structures throughout their education, encouraging variation in both teaching and problem-oriented project work. The basic theme of single-discipline group projects supported by courses can be accompanied by greater variation across semesters. This may take the form of students being confronted with different types of projects and collaborations throughout their programme. From single-discipline group projects to interdisciplinary projects where students collaborate across programmes and primary fields of study. These may be long-term projects where different groups contribute to the development of a joint product or provide different solutions to a major societal challenge. It could also include shorter, intensive programmes such as case competitions or hackathons. Common to these examples is that digital technologies can support collaboration between multiple actors beyond the physical space (see in particular the principle of collaboration and openness), and that digital learning resources can help support new relationships between course and learning activities and the project collaborations they are designed to support.

Thus, digital technologies can expand the realm of what is possible and contribute to variation at all levels. Digitalisation can contribute to variation in approaches to education and teaching activities by encouraging and supporting exploratory and experimental approaches, which can propel the development of the AAU PBL model.

VARIATION IN PRACTICE

PBL PROJECTS

In many of the [PBL projects](#) running in 2016 & 2017, as well as in more recent initiatives around 'Microcredentials', a common thread has been experimentation with creating new relationships between course teaching and problem-oriented project work. How individual courses have been able to work with 'flipped' teaching, to how digital resources at the semester level have contributed to better links between courses and project work ('flipped semester'). In relation to variation, initiatives such as [Megaprojects](#) and the [LeadEng](#) projects have experimented with multidisciplinary and interdisciplinary projects where students from different programmes or fields of study work together to develop concrete joint products (LeadEng), or where groups from many different programmes work on the same overarching societal challenge (Megaprojects).

GAME DEVELOPMENT VIA THE DANISH ACADEMY FOR DIGITAL INTERACTIVE ENTERTAINMENT (DADIU)

DADIU is an example of creating variation for students by giving them the opportunity to act in a real development team and work in a studio through a multidisciplinary programme. The programme offers a high degree of variation in both modalities and teaching activities, consisting of workshops, coursework, online resources and structured cross-study collaboration. In DADIU, students encounter a wide variation of activities and modalities in a realistic programme that contributes to increasing the students' sense of motivation, self-determination and meaningfulness.



2. COLLABORATION AND OPENNESS

Digital technologies enable new types of collaborations that go beyond the individual course or project work, and where it is easier to open up for other stakeholders, a larger number of participants, create cross-collaborations or incorporate entirely new forms of collaboration.

At the course level, collaboration and openness can be approached in a number of different ways. On the one hand, greater internal collaboration and openness can be achieved by allowing groups to view and comment on each other's work, or by students working together to create, for example, a shared online resource with an overview of key theoretical concepts. Work can also be done to open up courses to external stakeholders, e.g. by including online guest lectures or courses, by opening up courses to external participation and inviting practitioners from the outside world to participate and contribute. Furthermore, students and lecturers on a course can contribute to creating online resources that are not only internally accessible but open to the outside world.

At the semester level, digital technologies can be incorporated to increase openness and collaboration across courses and across courses and project work. Learning Management Systems, such as Moodle, are often organised into different spaces, which in principle may be accessible, but where creating cross-disciplinary openness and collaboration can be challenging in practice. Here, work can be done to open up for learning communities that extend beyond the individual courses and project groups. This can be considered internally within semesters, but also across semesters within the same programme, as well as over time, where students' products in one semester can be transferred for further refinement.

At the programme level, digital technologies can expand collaboration and openness in a variety of ways. This can increase the opportunities for students to collaborate across programmes within AAU (such as in Megaprojects or the LeadEng projects), but digital technologies can also open up national and international educational collaborations. Programmes or parts of programmes at AAU can open up for collaboration with the outside world, and problem-oriented project work can be considered in international collaborations with other students (e.g. where students collaborate on solving sustainability challenges in other contexts). At the same time, there is also an opportunity to incorporate external educational elements or courses (e.g. open online courses, open learning resources and Microcredentials) into AAU's programmes and to support students' project work.

COLLABORATION AND OPENNESS IN PRACTICE

COLLABORATION IN PRACTICE

The GIRAF project is an example of collaboration where 60 students, 13 project groups, from the Software, BA programme participated in a joint project in which mixed groups worked on the same common problem of developing an app for children with autism. Students also collaborated over time, with new students building on the work of previous students and thus accumulating knowledge. The complex, collaborative project was enabled, among other things, by digital technologies such as platforms for project management and communication within and between groups, as well as shared simultaneous access to, and synchronisation of, resources.

OPENNESS IN PRACTICE

Wikipedia for Knowledge for the World is an example of openness from the Product and Design Psychology programme, where third-semester students worked according to the AAU ideal of "Knowledge for the World" by producing articles for Wikipedia as part of the Cognitive Psychology course. The use of a well-known open source digital platform has made it possible to open and connect students' activities to the outside world, thus contributing knowledge to the world. New students have the opportunity to build on previous students' Wikipedia articles or start new topics, which means that this is also an example of how digital can accumulate knowledge over time in a shared open resource.



3. CO-DETERMINATION AND EMPOWERMENT

Co-determination and empowerment are central parts of the educational model in a PBL-based educational institution, and can be understood from the student's perspective as involvement and engagement in their own educational choices and processes. In problem-oriented project work, this is realised through the fundamental principle of participatory project management. Digital technologies can support empowerment and help increase student participation beyond project work. They can enable larger and more active learning communities, involving both students and lecturers within each programme, but also across programmes. Participation in such learning communities has the potential to provide students with what is perceived as a more engaging study environment, where shared academic interests take centre stage and where closer communication and relationships between lecturers and students can enhance student empowerment.

At the course level, digital tools can help strengthen participation and empowerment, for example, by acknowledging students as resources, both in the classroom and for each other. Students can contribute to creating a stronger digital learning community as part of the course and, for example, be encouraged to share relevant external learning resources and materials digitally that can complement course and project work. Furthermore, students can be involved in providing each other with structured peer feedback online, as they do throughout the project work.

At the semester level, establishing student-led digital learning communities can also strengthen participation and empowerment. This is already happening in many programmes and semesters, with students often organising online groups outside the AAU system landscape. However, there may be a strength in the fact that programmes and individual semesters also work with structured, professionally oriented digital learning communities that can create better visibility and communication across courses and across courses and project groups. These can act as shared resource banks, but can also be relevant, for example, in relation to maturing project topics prior to group formation or by linking students, supervisors and lecturers in semesters with project-oriented programmes (internships). Furthermore, such learning communities can also be envisaged across semesters, where they could include networking groups around key topics of the programme.

At the educational level, the principle also points to the digital opportunities to increase student participation and empowerment through strong digital learning communities, but also the greater personalisation of education that the digital enables. Students have new opportunities to shape their educational profile through online access to global learning opportunities. This is an empowerment where students can access external online courses and learning materials themselves and make it part of their learning. However, as a PBL institution, it is important to stick to the basic PBL principles of collaboration and that students are responsible for their own and others' learning. Thus, programmes can work on how individual activities can be linked to, and enrich, other learning communities (project group, cluster, other students in the semester, etc.)

PARTICIPATION AND EMPOWERMENT IN PRACTICE

CO-DETERMINATION AND EMPOWERMENT THROUGH DIGITAL LEARNING COMMUNITIES

"Cohesion, interaction and knowledge sharing" is an example of working to create stronger collective learning environments among students during the first semester of the Communication and Digital Media programme. Here, lecturers worked on using digital social networking sites to support the creation of learning communities in which project groups were able to share knowledge across groups, among other things. The digital also helped to create a stronger collective awareness of how students can be a resource for each other and take responsibility for shared learning.

PBL EXCHANGE – A DIGITAL PLATFORM FOR STUDENTS' BUILDING OF PBL COMPETENCES

The aim of PBL Exchange was to offer a digital platform to support the exchange of PBL-related experiences, especially among first-year students, which could also continue in later semesters, so that experiences could be shared across years with the possibility of involving PBL lecturers. At the same time, the platform had to ensure that students did not feel that their participation could have negative consequences. The platform was an interesting example of how digitalisation can empower students and also increase the conditions for participation by providing a structured forum for discussion and exchange of experiences among students.



4. INCLUSION

Inclusive study environments with an equal, appreciative and respectful culture are a high priority and play an essential role in good student life. Digital technologies can help to support inclusion efforts through a conscious focus on accessibility, diversity and flexibility. The principle aims to make learning and teaching activities accessible to all students, but also to ensure that each student feels able to participate according to their individual abilities. A conscious focus on meeting different needs in the course teaching itself, in a semester or in the organisation of a programme can help to create better participation opportunities for students with diverse backgrounds.

The principle of inclusion in education aims to increase accessibility for more students, with a special focus on, for example, students with disabilities or impairments, by enabling the use of multimodality and digital aids. For example, voice recognition systems can be used to automatically add subtitles to videos or audio lessons for people with hearing impairment. Moreover, the combination of different ways of representing the same learning material (video, images, audio, text) can increase accessibility and thus help to create a variety of participation opportunities for students.

Digital technologies can also support the goal of diversity in education, e.g. by working actively to create spaces for more people across gender, age, nationality and social background. In digitally supported learning spaces, both at the educational and teaching level, it is possible, for example, to work with anonymised group formation processes, peer feedback across groups, semesters and programmes, and to create online learning communities with different forms of representation for students who do not thrive in certain physical teaching contexts.

Similarly, digital technologies can contribute to greater flexibility in how students can access both coursework and whole semesters. Flexibility can support the principle of inclusion, as education with a high degree of flexibility can accommodate students' varying prerequisites for participating in educational activities (e.g. students with physical or mental disabilities). For example, flexibility can be organised by allowing some activities to be predominantly physical, some predominantly digital, and some a mix. For both group and classroom activities, some can be synchronised, while others can be asynchronous and in some cases revisited digitally, thus allowing greater flexibility in terms of participation and representation opportunities and allowing students with specific challenges to participate in educational activities on equal terms with others.

Inclusion is thus an underlying principle of education, with digital technologies expanding the scope for how AAU can better engage a more diverse group of people.

INCLUSION IN PRACTICE

COMPUTER ORCHESTRATED GROUP LEARNING ENVIRONMENT (COGLE):

COGLE is a software solution that supports and prepares students for group-based project work with neurotypical and neuroatypical group members by facilitating project group learning processes. The system makes use of short videos and subsequent reflective questions for group discussion, as well as peer instruction to ensure group knowledge sharing and a consistent level of involvement in the project content. COGLE is an example of how digital technology can support group processes and interactions in more inclusive ways that help neurotypical and neuroatypical students create a safe working environment.

FLEXIBILITY AND FEEDBACK

The Programming Paradigms course in the Department of Computer Science in Semester 7 focuses on digital support for inclusion in practice through focus and flexibility. During the project period, the course teaching took place in Active Learning Spaces at SSH, which are specialised rooms where students work at group tables with a screen system that supports knowledge sharing, co-creation and peer feedback in the learning space. To ensure a variety of participation opportunities for all students in the class, each session is concluded with short feedback and evaluation of the teaching, the academic level and the need for further training on the topic. Then, between lessons, videos are shared that directly address the students' needs and allow students to engage with the material in different ways.



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