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## INTRODUCTION

This thesis project is encouraged by an intention to resolve an identified problem in Adyghe State University (ASU). A significant number of students refrain from continuous meaningful coursework during a semester, dedicating time to it only within the short period preceding examinations. It results into disengagement with courses and underperformance. The situation is aggravated by the university-wide imperative to decrease the dropout rate which leads to the lowering of standards for courses completion or burdening faculty with numerous retakes.

To tackle the described issue, I offered to replace the existing system of end-of-semester examination with continuous assessment. I believed it would improve the learning environment that will lead to enhanced learning outcomes among students.

To achieve the goal of creating an environment that warrants better learning outcomes the following stages of the project have been implemented:

- Replacement of the end-of-semester examination with continuous assessment in 13 courses;
- Introduction of a syllabus with the outline of graded assignments at the start of a course;
- Web-facilitation of the courses with the new system of assessment by means of Learning Management System Moodle.

The hypothesis that I propose in the project is:

The offered system of continuous assessment creates predictors of better learning outcomes.

The success of the project is identified through the analysis of a group of predictors which signal that the environment is becoming more conducive to better learning outcomes. A number of predictors are singled out in the existing literature pertaining to assessment. A separate group of them are hypothesized to be relevant even though they do not emerge recurrently in the assessment research. In addition

to them, encouraging such environment merits and demerits of the implementation of Moodle are analyzed.

The methodology used for the analysis is based on the concurrent nested mixed-methods design, which includes surveying and interviewing students and interviews with faculty to capitalize on the multiple sources of data.

Assessment is chosen to be a key component in an attempt to resolve the issue as it is one of the most powerful tools in affecting an educational process. Its main goal is to prove acquisition of skills, knowledge, competencies, and attitudes by students. Numerous researchers analyzed effects of continuous assessment. Works of C. Rust, M. Yorke, S. Lynam and M. Cachia, H. Coates, G. Gibbs, H. Fry have described how it affects students' decision making, motivation, levels of stress, productivity, academic maturity. This thesis capitalizes on their work and expands it.

The significance of assessment is increasing in the time of growing tendency towards outcome-based learning, transparency, and accountability in Academia. In addition, assessment, while being seen as a final proof of work, has more potential to shape the learning process than any other component. It defines what students see as important, what learning events are included in the curriculum, how students and faculty allocate their time, how much in-class and out-of-classroom time is needed to perform well on a course, what pedagogical tools are selected and applied. That is why assessment is a powerful tool in organizing learning and bringing about meaningful changes.

In chapter one, I write about the role of assessment, its variations, continuous assessment, its advantages and disadvantages identified in existing literature. A part of the chapter is dedicated to the practiced in the world ways to tackle disadvantages. I also add a range of positive aspects of continuous assessment that do not usually appear in the literature on it in an attempt to expand the scholarly comprehension of the topic.

In chapter two, I justify the use of Moodle in this project, describe its current and potential use by the university, identify predictors of enhanced learning



outcomes which are meaningful to different groups of stakeholders to test if they are valid. I also found it necessary to provide a description of learning management systems as a tool to digitalize higher education and an overview of these products on the market.

Chapter three gives a detailed account on the stages of the project, starting from identification of the zone of experiment and unresolved issues and ending with stakeholders' analysis.

Chapter four describes methodology, design, samples, data analysis. It includes three studies. Study 1 is a quantitative research on the basis of students' survey. Studies 2 and 3 are qualitative analysis of semi-structured interviews with faculty and students. The data is merged and checked for the compliance with predictors in the Discussion part.

## CHAPTER 1. ASSESSMENT

In this chapter, I am going to give an overview of the role of assessment in education. I will focus on the most common problems associated with it, on conventional and innovative practices and on what makes them gain traction. I will also discuss why I offer to change the assessment paradigm in order to create an environment that facilitates better learning outcomes. The main part of the chapter is dedicated to the offered in the project system of continuous assessment with its identified in the literature advantages and disadvantages. A number of assumed advantages that are not traditionally associated by scholars with continuous assessment, but have this potential, will be described. I will give instruments to fix mentioned disadvantages and take them into consideration when formulating recommendations. In addition, these instruments might help to avoid unwarranted conclusions when analyzing data and conducting surveys and interviews.

## 1.1.IMPORTANCE OF ASSESSMENT

Assessment is a component of the learning process that dominates many other components and consequently defines them. Brown, Bull, Pendlebury [p.89-93] claim that if you want to change students' learning, it is sufficient to change assessment methods. Apart from shaping learning experiences, assessment as its prime goal "provides essential assurance to a wide variety of stakeholders that the people have attained various knowledge and skills" [Coates, 2015, p. 399]. Coates & Zlatkin-Troitschanskaia [p.510-512] claim that large-scale attempts to report and assess learning outcomes may help to plan, fund, and analyze skills strategies that will increase efficiency of workforce development. With the growing popularity of the idea of outcome-based learning and insofar increased accountability and transparency, the role of the assessment of learning outcomes in Academia is increasing exponentially. I believe that it shows a paradigm shift in programs and universities' evaluation, moving it from proxy measures like scientometric, graduate employment, and reputational indices to skills, knowledge and competencies acquired by students, i.e. learning outcomes.

From the managerial perspective, assessment must be paid special attention as it is an expensive component of the educational process. So, any changes deserve detailed analysis that adheres to the cost/benefit logic. Managers and executives can benefit from a well-structured assessment, preferably a comparable one, as it will be an indicator of the return on investments and can help to fine tune processes, excluding those that are cost heavy, but not efficient in terms of expected outcomes.

## 1.2.MAJOR PROBLEMS WITH ASSESSMENT

The problem, however, that is outlined in numerous studies is an outdated attitude to assessment. According to Rust [p.148-151] there is a significant lag between changed teaching methods and accompanying it assessment which might go back in its form to 1966 or 1946 and lack in its ability to check what students

have demonstrably learnt. Coates [p.400] as well emphasizes the fact that the dominating assessment methods in higher education have remained unrefined for years, unlike other salient components of the learning process with their robust development. This has made unsustainable practice rife. Another issue with assessment is a widespread misalignment between declared learning outcomes and assessment procedure. According to Gibbs [p.153], there are cases when the course instructor might require students to be thoughtful and creative; however, students can recognize that they get a good grade by merely memorizing and regurgitating information. More often than not, the learning outcomes written somewhere in the syllabus are not actually checked through assessment.

### 1.3. NEW ASSESSMENT PRACTICES AND HOW THEY SPREAD

It needs to be mentioned though that, despite a significant lag in assessment development, some innovative and promising assessment practices are nonetheless emerging. However, the scope of their application has not outweighed yet more conventional assessment tools. In their book “The Innovative University: Changing the DNA of Higher Education from the Inside Out”, Christensen and Eyring [p.60-75] analyze extensively how competition-by-imitation solidifies certain educational practices and scales them up. So, like in many aspects of life and entrepreneurial activities, once new methods of assessment are implemented by leading institutions, they will start to be perceived as more and more acceptable by those from the lower tier. This travelling of ideas is supported by the growing discourse around them in the epistemic communities that warrant not only knowledge generation but also its dissemination. Decision makers, managers, and top executives at universities rely on their expertise to justify introduction of new practices, including those in assessment. Ideas and practices, however, can be subjected to adjustments and transformations when they enter a new context. This process of editing to the local context is often referred to as environmental determinism. It means that practices and ideas will inevitably be tailored to the values, norms, and local dynamics belief systems, in many cases shaped by



historical contingencies or path dependency [Antonowicz et al., p.551-554]. Consequently, it can be expected that some practices of assessment and ideas associated with them will be entering more and more local contexts, while at the same time being adapted to existing agendas and imperatives that are shaping them.

The conventional toolkit of university practitioners usually includes: case studies, oral presentations, debates, essays, fieldwork, group presentations, in-class tests, reflection journals, laboratory reports, projects, open book tests, technical reports, end-of-course examination, peer-assessment, self-assessment, and so on. The way they are practiced and justification for their implementation can vary, stemming from the phenomenon of environmental determinism described above. The more innovative types of assessment might include: dynamic assessment, simulations, concept maps, primary trait analysis, collective portfolios, patchwork assessment [Patchwork assessment]. The velocity with which they will gain traction will depend on the take of epistemic communities on them and further on adaptation of them by the top tier institutions. March and Olsen [p.5-7] recognize two methods of ideas and practices spread: inherently logical, i.e. based on the analysis of risk factors and possible benefits, and cultural, where people follow the logic of appropriateness, tune it with the cultural code requirements, and follow fashions through isomorphic pressures. However, I believe that the spread of an idea or practice, first brought to the discourse by professional communities and then adjusted to the needs of local context, perfectly combines two variations described by March and Olsen. They never exist in isolation of one from another, but always work together with one following another.

#### 1.4.JUSTIFICATION FOR THE INTRODUCTION OF CONTINUOUS ASSESSMENT

According to Day et al. [p.939], student success at university depends on university environment, student characteristics, or both. The current project aims to tackle the first aspect and create an environment that will be conducive to better

academic performance of students. Chosen for this purpose strategy is implementation of continuous assessment instead of end-of-semester exams. Considering the significant role of assessment in shaping the learning experience and positioning of an educational institution described above, I believe that it is an aspect that might lead to the significant improvement in learning outcomes enhancement. Continuous assessment is chosen to replace end-point exams system, as its efficiency and merits are widely described and supported by scholarly articles. Singled out components of this type of assessment that result in enhanced learning environment and outcomes as well as its definition are presented in the paragraphs below.

Continuous assessment (CA) is the assessment strategy that replaces an end-of-term high-stakes examination, usually an oral exam, with a series of graded tasks that students complete while the course is still ongoing. Alternatively, it can incorporate both: graded assignments during the semester that let students accumulate points and a final exam which has some weight in defining the final grade but does not constitute it completely.

CA has got a number of advantages described by scholars. There are five of them that can be encountered most often. First, CA reduces the level of anxiety among students. It gives an opportunity to prove learning and receive grades with different weight multiple times. In the traditional system of assessment with one final exam 100% of a student's grade depends on one task, in most cases an oral exam. It leads to the high level of stress. According to Rust [p. 149-151], stress and anxiety together with other elements, such as heavy workload, high classroom contact hours, etc. lead to surface learning. Unlike deep learning, where students make meaning of what is learnt, connect it with prior knowledge, perform high order reasoning operations with the learnt material, surface learning, in many cases, is reduced to the regurgitation of facts. Second, Fry, Ketteridge, and Marshall [p.125-137] as well find graded assignments to be more conducive to deep learning than final exams that are considered to encourage superficial learning. Third, talking about dropout rates, Yorke [p.483-486] argues that

breaking down of large assignments into smaller ones and providing students with feedback on their completion can decrease the attrition rate. Similarly, on the way of achieving a certain learning outcome, students can benefit from milestones in the form of assessed tasks that indicate their progress or failure and through explicit or implicit feedback steer them in the right direction. Fourth, according to Rust [p.152] students tend to be strategic and seriously engage only with tasks that are to be assessed. If the only form of learning outcomes assessment is a final exam, students will refrain from doing course work until a week or two before it. It places achievement of learning outcomes at jeopardy. This way, pacing learning by organizing regular tasks that bear some weight in the final grade warrants continuous work and engagement of students, which portends higher success rate. Fifth, it is seen as a means to incorporate a significant amount of formative assessment in the curriculum design, which is characterized by higher level of feedback and is used to encourage desired studying behavior among students [Admiraal, Wubbels, Pilot, p.693-697], and reinforce learning.

In addition to benefits that are singled out from scholarly articles about continuous assessment, I would like to mention some other aspects that can contribute to the improved learning environment. Whether they do so will be analyzed further through surveys and semi-structured interviews. I find five of them to be relevant to this project and intend to subject them to scrutiny in this paragraph. First, many people are heavily dependent on meeting formal requirements. What is tested is learned with more eager out of pure desire to succeed at something that is validated by others. Here the word validated refers to the confirmation that activity done by a person is valued and supported, considered to be right, acceptable and approved by a course instructor on the basis of authority, educational environment, and peer learners. So the more opportunities a student gets to receive such validation, the more invested and encouraged they feel about a course. However, such validation can be seen as a reinforcer that is believed to foster extrinsic motivation. According to Wiseman and Hunt [p.120-136], it nurtures the desire among students to seek for approval in others' eyes and

makes them more concerned with self in others' eyes, which can narrow the focus and instead of focusing on academic content and beauty of learning students will focus on earning the praise and approval. The problem with such an attitude is that it can lead to increased rate of academic misconduct or superficial learning and take toll on students' emotional state. Whether benefits of such extrinsic reinforcement outweigh their downsides is to be identified in the current project. It should be kept in mind, however, that it is not a classical way of using praise as motivation. Students' grades are communicated confidentially and there is no ranking or comparison of students. Second, the fact that students know in advance all the graded assignments might foster the feeling of ownership of a course and lead to a bigger level of responsibility, as it will be seen as a fair agreement with the course instructor. Third, the description of the tasks in the syllabus with the stated grading criteria can increase students' confidence in the tasks completion, as they will be able to focus on relevant course material and will know what to expect from the assignment. Fourth, accumulation of points for course assignments can be seen as an element of gamification that can encourage to hit the top score. This is a tool that according to my hypothesis leads to a greater level of engagement. However, it is important to mention that the element of gamification in CA does not use comparison of students and overt award of badges, praises, or prizes, that are deemed to be reinforcers that undermine intrinsic motivation. For example, in the study conducted by Hanus and Fox [p.159-160] gamified courses resulted in decreased educational outcomes as intrinsic motivation of students, together with satisfaction and empowerment, was undermined by the process of competing. In the offered system of CA, gamification means a clear cut final goal and well-defined steps on the way of achieving it where students test and try themselves in completing a mission. Heilporn, Lakhal, Belisle [p.3-7] define engaged students as those that show compliance with rules and norms, have a sense of belonging to the course, are ready to master complex knowledge and do more than just attend or perform academically, they persist, self-regulate, and enjoy challenges. Whether there is any connection between the idea of gamification and associated with it

increased engagement in the CA system will be analyzed in this project. Fifth, this approach is more paternalistic. Students have to learn new things on the regular basis with an external pressure, lever, or to use educational terminology, extrinsic motivation. Although it might resemble an oppressive method of control, it has a benefit of organizing people's activity. Students will have to rely on their willpower way less, being pushed by the external factor. Willpower is a limited resource [Baumeister, Vohs, Strength, p.83-89], and the environment that drains this resource less should be more beneficial for the learning process.

### 1.5.THE MOST COMMON DRAWBACKS OF CONTINUOUS ASSESSMENT

To give it a fair judgment, it is important to mention identified in literature disadvantages of CA. Considering them will help not only to avoid misinterpretations of the collected data that will help to identify success rate of the project, but will also help to streamline implementation of the assessment strategy of ASU, where CA can become a core element. The criticism of CA usually is about two main points. First, it increases the workload of the faculty, as it requires more time for grading and providing feedback. A study carried out by Vahed, Walters, Ross [p.14-16] claims that faculty members found continuous assessment to be leading to “higher workloads emanating from administrative processes”. The same way continuous assessment is quoted to increase the perceived workload for students. In some cases it is aggravated by “assessment bunching”, which refers to some high stakes assignments with close submission deadlines [JISC, p.5-8]. Second, it may hinder the enhancement of self-organization skill and “academic maturity” described by Lynam and Cachia [p.225-231]. Academic maturity is defined as being cognizant of learning habits, strengths and weaknesses in academic skills, including the fact that “too much support from tutors leads to poorer work output” [Lynam & Cachia, p.231]. This way, an educational institution takes the responsibility of regulating students' course work by using external levers in the form of regular assessment out of fear that they will not work consistently on the course and might fail it. Such paternalistic attitude can warrant,



indeed, better learning outcomes on subject matters and retention rates, but it does not nurture in students transferrable skills of reflection and self-organization. The improvement of these universal competencies can be slowed down or undermined by the system of CA, which is an important aspect to bear in mind as, like many other universal competencies, not affected by CA though, they form the basis of not only academic success, but also an ability to function more successfully in any walk of life.

I believe it is important to mention what tools and strategies have been developed to alleviate mentioned above adverse effects associated with CA. None of these tools have been introduced in the current project, but their use might be considered later. After this action research there will be another iteration to reconsider and revise assessment practices, and the collected information about the disadvantages of CA in the context of ASU will help to define which of them might be necessary. So to resolve problems connected with CA, higher education executives resort more to edTech industry that is ready to provide automated solutions. It offers online tools, such as No More Marking ([nomoremarking.com](http://nomoremarking.com)), ecree ([ecree.com](http://ecree.com)), and Educake ([educake.co.uk](http://educake.co.uk)) to reduce teachers' marking load and are already being used in Bolton College [JISC, p.6]. Although such tools are still limited in the proper processing of the natural language, they have proven to be effective to give valid and instant feedback to students even in open-ended questions. The use of automated assessment may be a suitable solution for the formative assessment, i.e. assessment for learning, not of learning, while students are practicing. After this extensive and guided practice, they are to perform better at high-stakes assignments. As for the critique of students' overload, planning tools can be used to avoid assessment bunching, for example Map My Assessment online platform [Vahed, Walters, Ross, p.15]. The issue with academic maturity cannot be resolved here. I suggest a trade-off, as the aforementioned benefits of a more paternalistic approach of continuous assessment far outweigh the damage that this underdeveloped aspect can mean.

## 1.6.SUMMARY OF PREDICTORS AND RISK FACTORS

The described merits of CA are considered to be predictors of a learning environment conducive to better learning outcomes. The aim of this thesis project is to test whether they yield the expected results and whether introduction of CA creates such predictors of better learning outcomes in ASU in particular. The overview of possible adverse effects is also present to provide a balanced opinion on the value of CA as a systematic approach. Interplay between different aspects is to be analyzed as well in search of possibilities to improve the system, minimizing risk factors at the same time. All the predictors of better learning outcomes and risk factors are summarized in the Table 1.1 below to establish later their effects and interplay later.

Table 1.1

### Predictors of better learning outcomes in the system of CA

Predictors of better learning outcomes in the system of CA	
Identified in the literature	Additional ones hypothesized in this project
1. Reduced level of anxiety	1. Validation
2. Deep learning through high order reasoning skills	2. Feeling of ownership of a course
3. Decreased attrition rate	3. Increased students' confidence
4. More continuous, distributed work	4. Increased engagement through elements of gamification
5. Increased amount of feedback	5. Decreased reliance on willpower
Risk factors in the system of CA	
1. Increased workload for faculty and students	
2. Assessment bunching	
3. No development of self-organization skills	
4. No development of academic maturity	

## CHAPTER 2. LEARNING MANAGEMENT SYSTEMS

The second part of the project is its technical aspect. Changed system of assessment created challenges which could be resolved by the introduction of a Learning Management System (LMS). Its use, consequently, can open ways to new opportunities. These opportunities might contribute to further improvement of the educational process and administrative support. This part of the thesis is dedicated to the role of LMS in the current project and potentials of its further more extensive use. In this chapter, I am going to describe added value that LMSs give a higher education institution, additional benefits their use can provide, give an overview of existing LMSs, needs that led to an LMS introduction in ASU, clarify the rationale for choosing Moodle in particular, and describe main features needed for the project.

### 2.1.WAYS TO USE LEARNING MANAGEMENT SYSTEMS

LMS is an IT tool, a software application, that facilitates a number of learning activities, offering functions that help to organize many of the aspects of an educational process, from file sharing to tests crafting and assessment. It can be used for online and offline courses. It can be used for asynchronous classes, where lectures or educational videos are accompanied by training tasks, quizzes and tests and do not involve real-time communication with a course instructor or group mates. In such a modality, a learner is able to study offered material in a pace that is defined or not by course settings. It can be used for synchronous online classes, in which case students use a LMS as a file sharing resource with all their readings and external links, can track their progress through the course, see grades, upload assignments, and receive feedback. However, in this modality students interact with course instructors directly and use a LMS as a support tool. Real-time communication can also be organized within a LMS, as now most of them have a feature called BigBlueButton, which is an integrated videoconferencing tool. The

third way to use a LMS is as a tool of offline classes' facilitation. For this project the third application was necessary.

## 2.2.HOW LEARNING MANAGEMENT SYSTEMS BENEFIT HIGHER EDUCATION

The first LMS appeared in the educational space in early 90s. Later on they spread world over proving benefits for higher education. Such benefits affect the learning/teaching process in different dimensions and in this chapter I am going to identify and describe five of them. First, a LMS makes learning more convenient as it expedites access to necessary materials at the click of a button. It obliterates the need to queue in a library in a hope to get the needed textbook or painstakingly collect materials from different sources or means of communication used by a course professor. All the necessary files, tasks, external links, and recorded classes are stored in one place, which can be a great help for those who struggle with self-organization. The ease with which students can get hold of needed readings, schedule-related announcements and keep track of their progress affects engagement and motivation. Consequently, better accessibility of study materials can contribute to better levels of students' satisfaction and performance. Here it is important to mention that mobile design is significant. Nancy Rubin, who was in charge of the extended campus project at the University of Northern Colorado and Columbia University, says that, "Students naturally expect to use a smartphone or tablet (or both) to read, watch and interact with instructional content, submit assignments and share questions or ideas" [Rubin, 2018].

Some people, however, can experience hesitancy while working with new digital tools. They may seem to require inordinate amount of time and overwhelm users at initial stages. It is true that they all come with a daunting learning curve. However, it varies in its intensity from one software product to another. It is important to remember that organization of proper training with faculty and students at the stage of a LMS adoption and its consistent use can streamline work and alleviate possible anxiety and resistance.

Second, a LMS increases the sustainability of a university and helps to react more effectively to global challenges and shifts. It fosters creation of courses in different modalities. If a campus-based university starts using a LMS only to facilitate offline courses, it can quickly proceed to the provision of online, either synchronous or asynchronous, courses. As long as a HEI already has the launched system and trained staff and faculty, it can switch to emergency remote teaching rather seamlessly if need might be, for example, universities benefited from having it during the Covid epidemic outbreak in 2019. It can give an opportunity to organize online classes with invited professors who are not able to be on campus, this way resolving faculty shortage issues. Online classes can also be seen as a way to cut costs. First, the same course can be delivered multiple times to different groups with minimum work needed. Second, it can be used to decrease the number of contact hours and encourage more autonomous learning in students. As course materials are already organized and graded tasks are created, students can be less reliant on contact hours with course instructors and can be encouraged to acquire skills and knowledge at their own pace. Autonomous supported learning, unlike direct learning, is a tool to enhance information literacy competency among students. And vica versa information literacy, shaped by students confrontation with information sources, is a vehicle for autonomous and life-long learning [Singh, Kaur, Brar, p.83]. The burgeoning amount of knowledge in the world requires from present-day specialists to become self-directed life-long learners, and an institution that builds learning experience conducive to that is creating an environment and learning activities that add to the students' sustainability in both work and life contexts. The beliefs about and attitude to such practices targeting generic skills like knowledge literacy from the student body, however, can be negative at times. In the study conducted by Pinto, Garcia Marco, Fernandez-Pascual [p.217-223] a higher preference for the direct learning style in four aspects of information literacy was revealed among students. Even though in the article it is explained by the difference in the learning strategies and the level of self-efficacy, an additional factor can be a low level of awareness among students about



the benefits of information literacy and other generic skills, enhancement of which comes with their costs and is almost non-present in the directed supported learning.

Third, adjustment to shifts in the global student population can be assisted by the use of LMSs. There is an increasing demand for flexibility in higher education to overcome access limitations. The number of non-traditional students, those who study part-time or enroll to get a degree at the age above 25, is rising. According to the UNESCO working paper on learning pathways 11 per cent of people in Europe in their 20s enrolled in higher education see themselves mainly as workers who study part time; among those who are in their 30s there are 70 per cent with the same perception [Martin, Dogonoga, p.30-32]. Those who have to juggle their work and caring responsibilities with learning aspirations can benefit from courses that have clear structure, requirements, and materials that are accessible at any time from any place as long as your laptop or smart phone is with you. A LMS gives all these opportunities, and higher education institutions might consider reconfiguration of courses to make them suitable for those students who are not able to be present in classrooms all the time. It will require additional work from the side of faculty and administration, but the benefits it brings, in terms of broader student population and better retention rates, can outweigh investments. Here I am not talking about an extended campus, which requires more investments, but of a rather quick and simple solution, an add-on to the existing curriculum design, to get a broader audience. Moreover, it can be helpful in case a situation changes for traditional students who used to visit offline classes. Certain drop-out cases can be avoided if students are given an already developed and approved alternative to the traditional mode of studying and if they can easily switch from one to another. Bureaucratic obstacles that students have to face on their own can often become a reason why they withdraw. In addition, courses even partially available from a LMS can create the necessary conditions for building exchange and internship programs. Students will be able to enroll into them at any time and cope with their course work in the distant mode, having access to all materials. It

will not require additional administrative work connected with credit exchange and adjustments of a program on a case to case basis.

Fourth, in the era of datafication of education, LMSs prove to be a useful tool for learning analytics. By means of an LMS information about attendance, pace of learning, academic performance, and other salient parts of an educational process can be collected. It might allow teachers to timely and efficiently manage the process, adjust it to needs of students to achieve key success metrics. It helps to cost-efficiently collect information not only about individual learners throughout all their degree, but also about separate courses, and cohorts. LMS assists in this massive data analytics, and decisions about changes in a program can be evidence-based and reasoned. This is a way to investigate aspects of the learning process that goes beyond satisfaction surveys and warrant a better decision making. For example, we can compare how cohorts with different sequences of courses performed in standardized tests that those courses built up to, how attendance rate changes depending on the time classes are scheduled, what amount of internship or exchange experience warrants better jobs to graduates, whether reduction of contact hours changes students' performance and attitudes, what number of online classes and asynchronous courses is optimal within the cost/benefit logic. The sophistication of these analytics can differ. If a LMS has an installed high-end analytics feature, it might be enough. However, in many cases it is exported into Tableau, Qlik, or PowerBI [Leh, 2021] widely used in educational analytics and beyond. With the increased competition in the market for prospect students and growing number of competing higher education institutions, it is not wise anymore for colleges to stay blind and unawares of how their students perform and why. In addition, when this analytics are made public it showcases how much effort is put into achieving goals that a college claims in its mission and vision statements, it shows that the process of either teaching or administration is conscious and thought through. It guarantees that hit-or-miss practices are not the case for this university. In addition, harvesting of learning analytics can become the basis of an early-warnings system that is created to detect students at risk of failing separate

courses or dropping out. Although there are other means of collecting data, the use of a LMS that is already implemented in an institution creates a perfect opportunity for monitoring predictors of possible drop-outs. For example, the Universitat Oberta de Catalunya has developed Learning Intelligent System on the basis of a LMS of the university to help students succeed in their learning. An important component of their project is an Early Warning System that uses students' grades as predictors of their success or failure and provides a semi-automatic feedback to students at risk (which is determined by reaching a certain threshold) to amend possible failures [Baneres et. al, p.29-32]. In the current project in ASU, there was an attempt to create an early warning system. Even though it hasn't been streamlined and hasn't proven to be fully operational, the further steps to make it fully functional have been identified.

Fifth, Coates, James, Baldwin posit that LMSs can be "a means of regulating and packaging pedagogical activities by offering templates that assure order and neatness, and facilitate the control of quality" [p.25]. However unappealing this may look for the professorial staff, seeking autonomy in their teaching practices, I agree that the introduction of common frameworks and templates will have a positive effect on the learning process. Not only will it make it more aligned and predictable, but it will also add to the comparability of learning outcomes, which inevitably identifies best practices.

Tables 2.2 and 2.3 below summarize benefits of LMSs that have been overtly implemented, relied upon and tested in the current project. There are separate sections for features that bear significance for faculty and for students. The decision to separate them stems from the fact that they will be tested, using different samples of stakeholders. In addition, the table gives an outline of those factors that can be potentially beneficial for ASU but haven't been implemented and assessed in the current project. Mentioning of them is significant though, as they might be found relevant in the further improvement of the learning environment and will form the basis of the recommendations chapter.

Table 2.2

## Benefits of LMSs used in the project

Benefits of LMSs used in the project		
For students	For faculty	For administration
1. Quick access to learning materials	1. Quick grades communication	1. Data analytics for enhanced decision making
2. No use of multiple channels of communication	2. Quick way to collect assignments	2. More aligned and predictable pedagogical practices
3. Quick communication of course-related announcements	3. Communication of course-related announcements	
4. Grades tracking	4. Reusable courses	
5. Distance mode for assignments submission	5. Sharing of course-related materials	
	6. Assisted teaching in online modality	

Table 2.3

## Benefits of LMSs beyond the project

Benefits of LMSs beyond the project		
For students	For faculty	For administration
1. Enhancement of transferrable skills of information literacy and self-directed learning	1. A basis for diversification of teaching modalities	1. Quick reaction to challenges through the use of different modalities of teaching
	2. A source of learning analytics to timely adjust a course	2. Easier streamlining of classes with invited professors in an online modality
		3. Minimize costs through decreased number of contact hours
		4. Decreased drop-out rate for students with changed learning modality
		5. Reach out to a bigger student population
		6. Streamlining of exchange and internship programs
		7. Higher transparency through publication of collected learning analytics
		8. Comparability of learning outcomes
		9. Creation of an early warnings system
		10. A basis of the system of early warnings

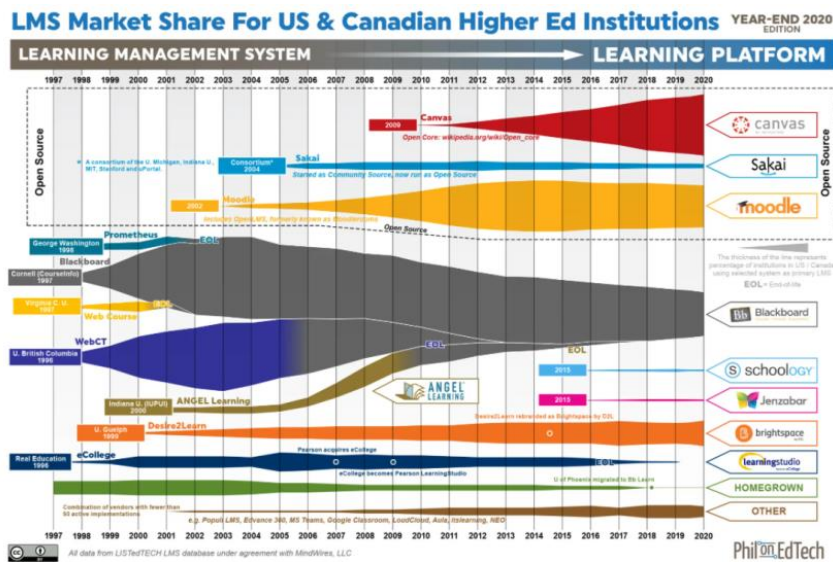
### 2.3.KINDS OF LEARNING MANAGEMENT SYSTEMS ON THE MARKET

The market these days is full of LMSs tailored to the needs of various organizations. Such abundance gives an opportunity to find a perfect match. There are certain ground features that define a LMS. Firstly, they can be open source or proprietary. The former means that source code of a LMS is available to anyone and free. A LMS, however, will still cost an institution something. It will require customization done by an IT team, which is a process that means significant expertise and resources. Hardware in the form of server might need to be bought if it is not a cloud-based technology. If it uses cloud technology, it can come with its price, especially if it is a private cloud. The open source LMSs use a so called fermium payment model where the basic set of features is free, but for extra options one needs to pay. Proprietary LMSs are widespread in the market as well. Their vendors offer products pro bono and have subscription fees for access. They are based on a closed code and usually require annual payment. The hosting options are similar to those of open source products; they are either in-house or cloud-based. The maintenance is taken care of by the provider, which means that there is no need to create an IT team that will have to deal with security patches and customization. Secondly, there is a different capacity for integration with other digital tools used by a university. If a higher education institution is using Student Information System, its compatibility with a LMS will be significant. Here an open source variant will be more reliable, as it can be fully adjusted to the needs of the user. Thirdly, it is important to choose the migration of the content policies and of a LMS. In case a university decides to switch to another LMS, migration of course materials and analytical data can significantly hinder the process.

These days, it is difficult to find a HEI with good name recognition and substantial investments into the educational process that is not using a LMS. For example, New York University in 2021 started to use Desire2Learn Brightspace, Cambridge Learning Management System in Cambridge University, Canvas in Harvard, Auckland University, Stanford and Princeton. The market shares of major



vendors in United States and Canadian higher education institutions for year 2020 can be seen in the squid diagram (Pic. 2.1) below. Open source free LMSs have the biggest share with Canvas (32%), Moodle (22%). Proprietary Blackboard demonstrates a downward trend (23%) and proprietary D2L by Brightspace, which comes fourth in this market distribution, is on the rise reaching 13% [Hill, 2021].



Pic. 2.1. The squid diagram that illustrates LMSs market share in American and Canadian universities. Taken from [Hill, 2021]

## 2.4.LEARNING MANAGEMENT SYSTEM IN ADYEGHE STATE UNIVERSITY

In case of ASU, a LMS became a necessity in the time of pandemic when all the classes were offered in the online mode. It was the first time a LMS was introduced in the university, so the IT Services Department offered asynchronous classes to faculty to get the grasp of basic features. The process was not seamless, as the server capacity did not cope with the number of students, and an alternative to a LMS was immediately offered. This way a LMS started to appear as a not reliable tool with a steep learning curve. In addition, to that training courses to work with this new software were not organized. Educational videos were recorded and offered to the faculty, but their voluntary use resulted in the very low rate of users. Without having an external requirement to familiarize themselves with Moodle and use it on a regular basis, most of the faculty refrained from doing so.

This is an aspect which was taken into consideration when designing current experiment, where implementation of LMS Moodle is monitored and required. As for the first attempt to use it extensively, Covid restrictions were lifted rather quickly for ASU, so a practice of consistent use of a LMS hasn't stayed. It was brought back into the spotlight with the launch of new programs where we decided to take a closer look at the possible enhancements of administrative and educational processes. The current project, for example, required efficient ways to communicate students grades confidentially, let them keep track of their progress in the course, get a quick access to course materials, including recent publications, provide feedback for assignments, harvest data on attendance and academic performance. The last part is necessary not only to make informed decisions about the structure of courses and programs, but also to send across the message that the established rules are monitored and required from everyone. This measure is needed, as the previous attempt to introduce continuous assessment failed due to the lack of administrative control and persistence.

ASU chose to adopt LMS Moodle. This decision was made after the analysis of similar product on the market and was mainly encouraged by its fee-free policy and the fact that the university has a big IT-team that was well-trained to install it and provide constant maintenance. It was fine tuned and customized to the needs of the university by its IT team. This LMS has numerous advantages. It offers multiple opportunities in content delivery, assessment, grades and attendance management. All the necessary for the project features are available. In addition, it is continuously upgraded and can be integrated with other digital tools like Student Information Systems (SIS). It has not only a desktop, but also a mobile version. Even though it has been criticized for having not the most intuitive user interface, clunky navigation, and absence of visual finesse, it still remains to be an effective solution for universities and is highly ranked. For example, a study published by Basaran and Mohammed [p.402-405] analyzed system qualities of top 5 open source LMSs. Moodle was determined to have the highest system quality in comparison with four others – ATutor, Eliademy, Forma LMS, Dokeos. It was

ranked number one in functionality, reliability, usability, efficiency. The scope of its use with 216 countries also exceeds that of other selected for the study LMSs. It needs to be mentioned here, however, that the world's most popular open source LMS – Canvas - was not sampled for this study. Due to the speed with which it has received such a big share of the market, it can be assumed that it would rank even higher than Moodle in its system qualities.

## CHAPTER 3. STAGES OF THE PROJECT

### 3.1. UNIVERSITY CONTEXT

The project started with the identification of possible zones of enhancement in the educational environment of ASU. In 2021 the university launched a big scale experiment in the curriculum design of five bachelor programs: Mathematics, Applied Mathematics, Literary Studies, Biology, Psychology and Social Work. The total number of students at the start of the second semester was 102. For the first two years students of those programs will have core classes together in the mixed groups, which has never been practiced before. The students for some courses there are grouped in accordance with the level of their expertise in the subject to foster its further enhancements and not on the principle of their major. This way students majoring in Mathematics can be studying together with those doing Literary Studies or Biology in their English course or the one on the Russian Punctuation. Such distribution of students has not been practiced before; they have always taken courses only with students from their major, which was seen as a limitation, because streaming based on the level of mastery was not possible. It resulted into disengagement of some students, because of the simplicity or excessive difficulty of the offered course material. According to the new curriculum design 50% of courses in years one and two are core courses and the other 50% are major courses. The described curriculum structure can be seen in Table 3.1 below. Years three and four are completely dedicated to major courses of the programs. This experimental environment was chosen for the current project as

well for two reasons. First, five programs were completely redesigned, or I can even say started from a clean slate, which means that they didn't have long-standing practices and faculty who have been using them for years. This is a factor that decreased resistance from the side of professorial staff. Second, administration of the university was open to introduce new practices and approaches to teaching and learning there in an attempt to find those that can be scaled up and be beneficial university-wide. The project was scheduled for the second semester, starting in February and ending in May.

Table 3.1

### Curriculum design in the experimental programs

	Year 1		Year 2		Year 3	Year 4
	Core courses	Major courses	Core courses	Major courses	Major courses	Major courses
Mathematics						
Applied Mathematics						
Literary Studies						
Biology						
Psychology and Social Work						

### 3.2.A PROBLEM TO RESOLVE

Interviews with Heads of Departments and the Associate Director for Education revealed dissatisfaction with learning outcomes of students. The absence of continuous control over the students' learning during the semester and reliance on their self-directed and self-regulated learning resulted in certain cases in disengagement with courses. Without the environment that would encourage students to weekly dedicate their time to working on designated learning outcomes of a course, significant percentage of them chose to refrain from meaningful work and dedicated themselves to it only within a short period of time preceding end-of-term examination. The result of this was underperformance at the exams. The threat of increased dropout rates aggravated the situation. Course instructors were

forced to either lower the passing threshold or schedule numerous retakes. To resolve the raised issues a changed system of assessment was offered. I believe that it allows creating a learning environment conducive to better learning outcomes. The changed system of assessment required introduction and consistent use of digital tools like LMS Moodle. First of all, it was necessary to organize a system of confidential grades communication and its tracking by students and faculty. Later on other aspects of the use of LMS Moodle were identified that I believe contribute to an environment that can enhance learning outcomes of students. This way the project has turned into a two-fold initiative, both parts of which are believed to warrant an environment that will help to resolve the outlined above problem with students' underperformance.

### 3.3.STEPS IN THE PROJECT IMPLEMENTATION

The development of the project started in October with the design of the project which included identification of expected outcomes, analysis of available means, creation of the timeline, stakeholder analysis, description of necessary stages and metrics of success.

After the negotiation with administration about the means and resources that can be allocated to the project realization, a series of workshops and information sessions was organized. Prospect faculty members were familiarized with the aims and intended procedures and were given a choice of either joining or refraining from it. In total, there were two information sessions and two workshops. In the information sessions the details of the changed system of assessment were described, there were examples given of possible graded assignments, the necessary components of LMS Moodle and their use were discussed. In the workshops, a template where graded assignments need to be outlined together with their weight, description of grading criteria, sample questions for tests, and deadlines was introduced to the faculty members. All participants had to stick to the same template, as I believe it decreases the cognitive load on students. Documents organized in a similar way help students in a less consuming way

familiarize themselves with the information concerning assessment in a course. A lot of time was dedicated to work with LMS Moodle that was a new digital tool for many participants. Features that were explained and their use was practiced included: file and link sharing, enrolment on the course, attendance tracking, gradebook, a tool for creating assignments that will be uploaded by student into the system. Although LMS Moodle has a plethora of diverse features, the current project required to use only those described above. However, the faculty members were not limited to use only them and were invited to self-explore other features and implement them in their courses.

Further on the work was continued in the form of individual consultations to resolve on a case-to-case basis emerging issues either with LMS Moodle or with the assessment. All in all, 15 faculty members took part in the project. Eight of them are teaching core courses: the English Language (Elementary), the English Language (Elementary), the English Language (Beginner), the English Language (Pre-Intermediate), Worldview (Natural History) with two faculty members teaching it, Punctuation in the Russian Language, Adyghs in World History. Seven participants were teaching the following major courses: Science about Earth, Parasitology, Project Work in LaTeX, Chemistry and Methods of Chemical Research, General Biology, Professional Activity of Tutors and Governesses.

The final stage of the project was the collection of data for metrics to define the project's success or failure and describe necessary steps to increase its efficiency in further iterations. The detailed account on the measurement procedure and drawn conclusions can be found in the next chapter.

### 3.4.EARLY WARNINGS SYSTEM

In the initial design of the project, one of the stated outcomes was the creation of the early warnings system. Information about the academic performance in graded assignments can lead to the identification of those students who are risking failing a course or drop out. Such data should be harvested in the middle of semester and reported to specialists who will devise a system of

interventions to prevent failures of courses. I intended to harvest this data from LMS Moodle, where participants of the course kept track of it. Even though creating of separate grading and attendance sheets is a widespread practice, in this experiment my intention was to refrain from multiple sources of data collection and decrease the amount of time faculty members and administration have to spend on it. Within the project, the goal of creating such system was not met due to the lack of a unified approach to grading and reporting on it from the side of faculty members. I believe that the situation can be improved in the upcoming semester through additional discussions and workshops dedicated to the technical aspects of LMS Moodle. The procedure for collecting data though has been developed and tested. It involves a series of SQL codes used by LMS Moodle that extract information about attendance and grades of students using a course id. The report chart is dynamic, which means that every time there is a new input on any of the courses, it is immediately reflected in the tables and bar charts.

For the early warnings system the challenge to be resolved was difference in deadlines for course assignment and the necessity to calculate how many points out of possible by the middle of semester students accumulated. The automatic way to do that without asking the faculty to input additional data is the following. SQL code extracts information about the number of scores accumulated by individual students, designates the top one to be the maximum and sets a 60% threshold for the success rate. Those students that accumulated less than 60% from the maximum reported number in the course are categorized to be in bad academic standing and the system color codes them. For example, in Table 3.2 presented below maximum number of accumulated points on the day of data extraction and analysis is 70, which is taken as 100%. Those students that received less than 60% from this designated maximum, which is in this case 42 points, are at risk and are highlighted by the system.

## Identification of students in bad academic standing

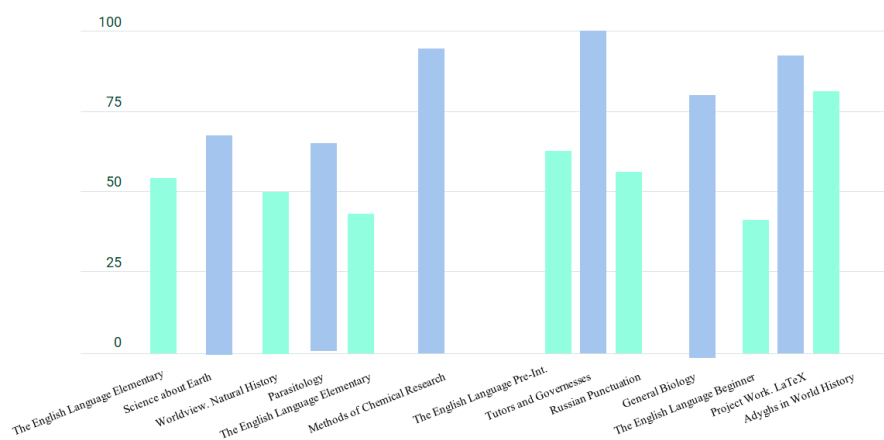
	Grades accumulated in the course
Student 1	70
Student 2	30
Student 3	40
Student 4	55
Student 5	68

In addition to the early warnings system, there were designed formulas to extract other learning analytics for further evidence-based decisions about curriculum and instructional design. The following sequences of calculations are used there to gauge the attendance rate and the success rate per courses. Information about separate courses is automatically collected in a bar chart an example of which is present below (Pic. 3.2).

$\text{N}^{\circ}$  of students  $\times$   $\text{N}^{\circ}$  of classes= $X$

$100 / X \times \text{N}^{\circ}$  of visited classes= attendance for a course

$100 / \text{total number of scores} (\text{N}^{\circ} \text{ of students} \times 100) \times \text{total number of accumulated scores} = \text{success rate}$



Pic. 3.2. Representation of data on attendance and students' success rate in courses.



### 3.5. STAKEHOLDER ANALYSIS

Stakeholder analysis was conducted in an attempt to find an optimal way of project implementation through the identification of probable proponents, detractors, and their levels of importance. Understanding of issues that stakeholders care about and the impact that the project will have on them helps to uncover suitable strategies, encourage or discourage coalitions, and eliminate roadblocks. To map the stakeholders, power vs. interest grid with a two-by-two matrix described by Bryson [p.31-38] has been used (Pic. 3.3). Y-axis in the grid shows stakeholders' interest, where interest is understood in a political sense and not as curiosity or inquisitiveness, while X-axis determines stakeholders' power to affect the issue at hand [Bryson, p.36]. Bryson [p.31] describes four groups of stakeholders: "*players* who have both an interest and significant power; *subjects* who have an interest but little power; *context setters* who have power but little direct interest; and the *crowd* which consists of stakeholders with little interest or power".

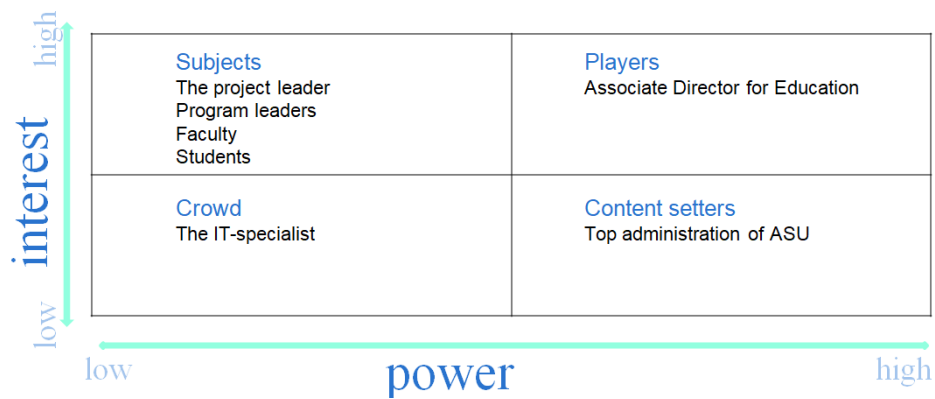
For the current project the Associate Director for Education, who is supervising the project and frameworks concerning teaching and learning in ASU, has been identified to be a player. She is a top decision maker of the university, so a lot of power is vested in her. At the same time, she is held accountable for the results of the project, as she is appointed to monitor it and allocated certain funds to its realization. So her interest is high as well. Context setters are top administrators of ASU, including Deans, Rectors, Directors for Students Affairs, Campus Policy, and so on. They are in the position of power and can significantly impact funds and facilities allocation. Such governing bodies are a common practice to avoid a phenomenon known as the tragedy of the commons, where people or organizations use available resources – known as commons - to their private benefit, without thinking how it would affect others or worrying about the conservation of the resource [Vince & Hardesty, p.138-142]. Not only do they distribute the commons, but also define university development strategies, its

vision and mission, which become the basis of further argumentation in the commons allocation. However, they have little interest in the current project, as it does not directly affect their areas of responsibility and requires scarce funding. Subjects of the project are faculty members, program leaders, students, and me, as a project leader.

All the subjects are limited in their power. Faculty members cannot make decisions about the broad framework of assessment in the courses; there is a set of precise rules that they have to follow.

Program leaders have to follow the instructions of the Associate Director for Education, who almost single-handedly makes a decision of which form of assessment is introduced in their programs. Students have almost no authorized right and opportunities to bring about any change, as the mechanisms of feedback from them in the form of unions that can stand up for certain ideas or course evaluations are not introduced in ASU. Such paternalistic soviet legacy of being objects in the learning process, not subjects, gives them little control over it. I am limited in my ability to allocate funds and make final decisions. All four sub-groups of subjects, however, have high interest. Faculty members together with students are directly affected by the introduced system of assessment that they need to practice in their courses. Program leaders provide administrative support, have power to implicitly foster or hinder the project, and monitor how the system of CA affects the learning process. I bear full responsibility for the success or failure of the project.

The crowd includes an It-specialist who has been assisting with technical aspects. His interest and power are estimated as low, as there were no incentives used to make him feel invested, and he out of kindness of his heart agreed to write the code for data extraction and assist with technical issues that emerged while using LMS Moodle.



Pic. 3.3. Power vs interest grid.

As I, as a project leader, fall for the subject category with little power, but high interest, the best strategy for me is to ally with the player in the grid and focus on achieving results that are meaningful for her. It helps to accrue power. At the same time the subjects group is the most representative. Speaking to their needs and receiving feedback is crucial, as a high level of dissatisfaction there may undermine the project. It can become the situation where the grassroots overthrow the strict top-down hierarchy because of their numbers and the significant level of dissent. In this project the strategy to win over professorial staff is used and it includes two aspects. First, the Gamson's theory about relationship between partisans and authorities was used. It posits that there are three ways of downward influence: persuasion, sanctions, and insulation [Bess & Dee, p.342-348]. Sanctions imposition may have a detrimental effect and aggravate the feeling of resistance even more. In addition, I believe that Academia needs to be built on the principal of mutual respect and benefit. So it is rejected from the start. The persuasion tool would require significant time investment and broader outreach to the faculty, which was a challenging task in the ASU context. So the insulation strategy of self-selection was chosen as the most viable one to deal with faculty that were categorized as potential partisans. They were offered to self-appoint themselves and join the project attracted by the opportunity to work in a more selective and prestigious environment, advance their knowledge and skills about

existing teaching tools. It is important to mention that all the participants of the project have significant teaching load in the courses with conventional methods, so they were not pressurized to join the project out of fear of losing jobs or teaching hours. Their decision was voluntary. Second, participants of the project were offered a reimbursement for the extra work hours that the new method of assessment is reported to bring about. In the future, if the offered strategy proves to be efficient and the number of those willing to work in this new method of assessment exceeds the number of offered teaching positions, the system of selective exit will be used to accrue power.

## CHAPTER 4. METHODOLOGY

For the current study a mixed-method design was chosen, as it “can offer the strength of confirmatory results drawn from quantitative multivariate analyses, along with deep structure explanatory descriptions as drawn from qualitative analyses” [Castro et. al, p.342]. The exact method of the project is a concurrent nested design which includes simultaneous data collection through qualitative and quantitative methods. Within this design qualitative and quantitative components are not equal but one is embedded in another. The predominant component is quantitative, and it is used to identify whether the implemented twofold project of the changed system of assessment and its support by the use of LMS Moodle has created predictors for better learning outcomes among students. The results of it are described in “Study1” sub-chapter. The quantitative component is chosen to be dominating as the hypothesis has already been formulated and requires testing. To do so variables linked to the hypothesis have been isolated and defined. The qualitative component is embedded and bears less priority in this design. It includes interviews with two groups of participants: faculty members and students. The aim of this component is to analyze experiences and perceptions from the standpoint of participants. The results of these two stages are described in sub-chapters named “Study2” and “Study3”, where key informants are faculty members and students respectively. Integration of the received data is conducted in the discussion section and is done to benefit from the incorporation of multiple sources of evidence that are to lead to conclusions grounded in data.

### 4.1.STUDY1

Students studying in five programs with experimental curriculum design completed a descriptive questionnaire in May 2022. Although the total number of students participating in the project is 102 (N=102), only 43 of them took part in the questionnaire (n=43). So the questionnaire response rate is 42%. The relatively low response rate is explained by the fact that many certain students dropped out of

their programs by the time of the survey. However, the data on their exact number and status was not available. Data collection was anonymous and only information on gender and the students' majors was collected there. Participants were invited to answer 9 closed-ended questions to elicit their experience associated with variables that are hypothesized to create an environment conducive to better learning outcomes in the new system of continuous assessment coupled with the use of LMS Moodle. One of the questions was a yes or no type and the rest were the Likert Scale multiple choice questions with a 5-pointer structure. Identified variables included: level of anxiety, complexity of performed tasks (high order or low order activity), intentions to drop out, role of feedback, distribution of course-related work, efficiency of external levers, workload, fairness of received grades, transparency in a course design. For example, respondents were asked to separately estimate their level of workload and perceived fairness of grades in CA and in end-of-year assessment, or they had to estimate their level of reliance on external reinforcers. The questionnaire was translated and offered in the Russian language.

Univariate descriptive analysis has been used for the background characteristics of the sample. It is presented in Table 4.1 and shows frequency distribution and percentage concerning gender and programs or majors of the respondents. The majority of the sample is presented by female students (70%). In terms of programs distribution the most representative groups are students of Applied Mathematics and Psychology and Social Work majors with 35% and 37% respectively.

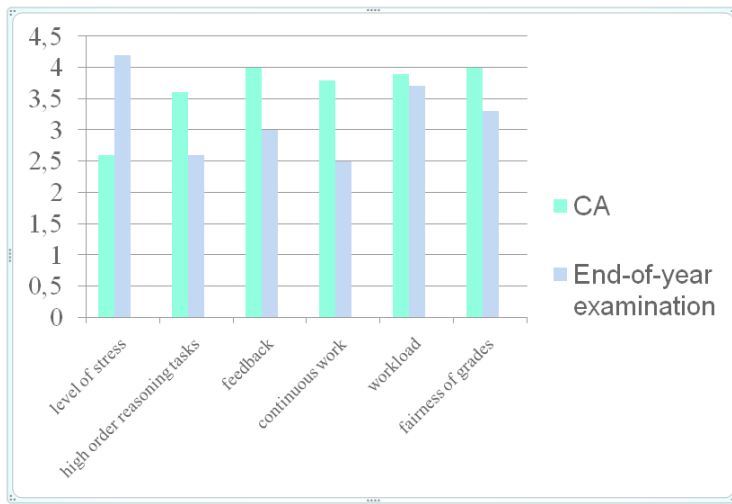
Table 4.1

## Background characteristics of the sample

Respondents' major	Frequency	Percentage
Biology	9	20.9%
Mathematics	1	2.3%
Applied Mathematics	15	34.9%
Literary Studies	2	4.7%
Psychology and Social Work	16	37%
Gender	Frequency	Percentage
Male	13	30%
Female	30	70%

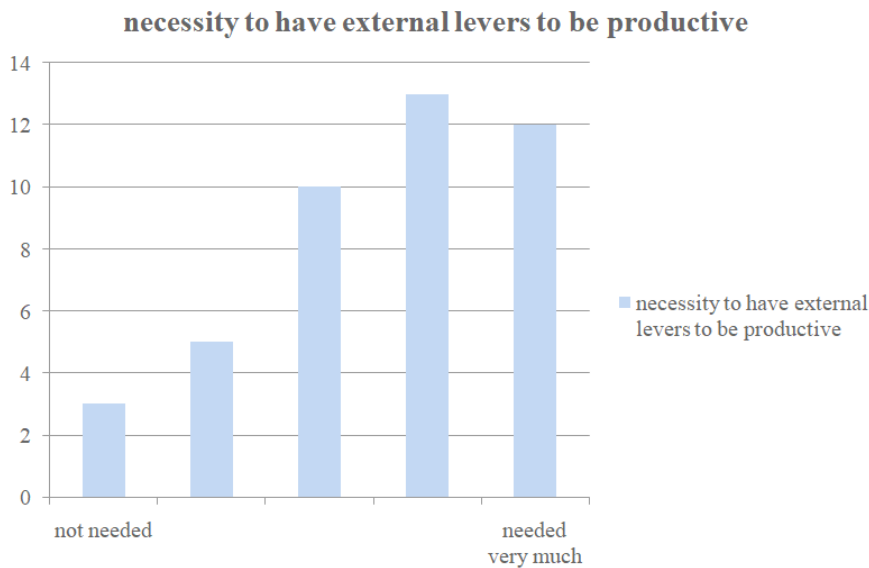
To assess the reliability, or internal consistency of measured concepts with the Likert Scale, Cronbach's alpha has been used. Even though there were only 8 questions with the use of the Likert Scale, some of them were divided into two parts where respondents measured the same aspect, for example, the level of stress, in the system of CA and in end-of-year examination system. There were six questions with such a structure. All in all, it resulted into 14 items that were analyzed. The reliability score is  $\alpha = 0.7$ , which is considered to be an acceptable level of reliability.

The analysis of 9 predictors that are to create a better learning environment is presented in the bar charts below and show the average of respondents' answers on a 1 to 5 scale. The following bar chart (Pic. 4.1) illustrates measurement for 6 predictors comparing how students estimated them in two systems of assessment: CA and end-of-year examination. The level of anxiety associated with completing graded assignments in CA is 2.6 which is significantly lower than that in the traditional end-of-year examination (4.2). The next predictor estimated the amount of high order reasoning skills like analysis and construction, as opposed to low order reasoning skills of memorization and regurgitation, and is estimated to be 3.6 in CA and only 2.6 in end-of-year examination. The next two bars show the amount, quality, and usefulness of feedback. In CA respondents declared it to be 4.0 on average – which means that it was rather helpful and extensive, in end-of-year examination system it was lower and reached 3.0. The same way it has been found that in CA students worked more consistently on courses (3.8), allocating at least several hours a week to it, whereas in the end-of-year system this parameter has reached only 2.5. The amount of workload in CA was slightly higher with 3.9 than in end-of-year examination with 3.7. The fairness of grades, i.e. how much from the perspective of students received grades correlated with skills, knowledge, and academic performance of their recipients, shows that this correlation is higher in CA (4) than in the end-of-year system (3.3). As it transpires from the bar chart the biggest difference between two systems is in the level of stress (1.6) and how continuously students work on courses (1.3).



Pic. 4.1. Comparison of predictors estimated in the survey in two systems of evaluation.

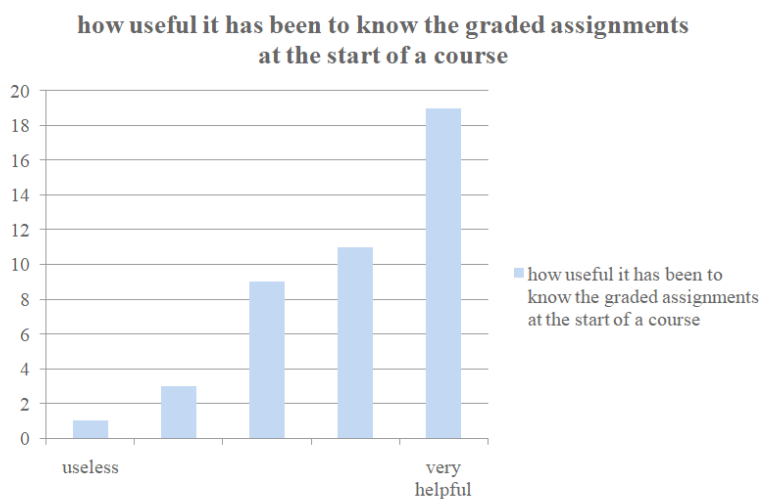
The next bar chart (Pic. 4.2) depicts the results of the question where respondents did not provide comparable results. They estimated how productive they are at the presence of external levers fostering work in the form of deadlines and arrangements with other people. The information in the bars reflects the number of students choosing different options. As it can be seen absolute majority works to different extent but better within the presence of such levers.



Pic. 4.2. Estimated productivity of students at the presence of external reinforcers.



The following bar chart (Pic. 4.3) shows how helpful for respondents was to know the graded assignment of the course at its start. 19 respondents found it to be very helpful with only 1 claiming that it was useless.



Pic. 4.3. Usefulness of provided information about graded assignments.

Finally, the respondents answered a yes/no question about their intention to drop out associated with completion of graded assignments in CA (14% of people said yes) or with end-of-year examination (58% of people said yes). The results are illustrated in Table 4.2

Table 4.2

<b>Intention to drop out associated with assessment</b>	<b>Frequency</b>	<b>Percentage</b>
Continuous assessment	6	14%
End-of-year examination	25	58%

It can be seen that 8 identified variables in the system of CA either show it to be more advantageous than the end-of-year examination system or are estimated by students as factors fostering learning without comparing them. The predictor that is estimating the workload in two systems is used to control for adverse effects that might be caused by CA. But as long as the increase in the perceived amount of

work done in CA in comparison with end-of-year examination is only 0.2, it can be seen as insignificant and leading to any detrimental effects that can undermine positive changes brought about by CA.

## 4.2.STUDY2

The qualitative component where faculty members were interviewed was conducted to comprehend their experiences while using CA and LMS Moodle. There were 8 interviews conducted in Russian, which comprises 53% of the total number of the faculty members participating in the project. Main themes are identified here and subjected to analysis. Respondents' quotations are used to support interpretations.

Concerning LMS Moodle, all participants found it to be useful and would like to continue using it. The recurrent pattern can be seen in the positive attitude to the features of file-sharing, course-related announcements, use of deadlines, and created in the system tests.

It is evident that the appreciation of the LMS grows together with the expertise in its use. More experienced users posit that it helps to save time using the automatic grading for the tests. However, less experienced ones find it time-consuming that can lead to dissatisfaction. It can be explained by the learning curve of any new tool. In addition, it signals that not enough training was organized for those who used it for the first time, which is supported by the explicit request from two of the respondents:

*«I would like to have more video lessons on the use of features in Moodle. Sometimes I face difficulties with settings and monitoring of a course».*

*«Learning of how to use Moodle in online classes on Zoom was ineffective. It was done in big groups and there was no way for an instructor to tackle questions from participants. I would like the university to organize offline classes in small groups that will help to gradually grow expertise and become a more confident user».*

A topic of autonomous learning was raised. While some respondents see it as a way to reduce contact hours as a praise for faculty who invest more time into courses by using LMS, other participants expressed their concern about the intention of the university administration to turn some courses into online asynchronous ones:

*«LMS can be used as an additional support tool or the one relied upon in case of emergency like a pandemic, but I wouldn't like to have my courses organized only on Moodle without live offline interaction with students in a classroom».*

Another recurrent topic is connected with the absence of free Wi-Fi and necessary equipment at the university buildings:

*«I organize in-class tests for students. The tests are created on Moodle, but students sometimes cannot open them from their phones. To take attendance and grade students during the class, I need to be online all the class, but WiFi is not available in all the classrooms. If you don't do it right away, this information can be lost. If you first put this information in a paper register and then transfer it online, it takes too much time».*

The system of continuous assessment was seen as a useful by all the respondents, and all of them would like to keep using it. Observed increased motivation among students and more dedicated work on courses is named. It is attributed mainly to students who are already in good academic standing and demonstrated engagement before the introduction of CA. Those students who were in bad academic standing are not seen to be affected by the changed system much. The faculty report them to be sticking to old habits of ditching classes and hoping to pass a course anyways. Their line of reasoning must be that the university will

bend rules or give them multiple attempts to retake assignments, as they are well informed of the university wide policy which instructs not to expel students at any cost:

*«Students actively participated in points accumulation. They were driven by the idea to reach the maximum possible results and ask to redo an assignment even if they succeeded in it».*

*«It was interesting to see that even if they had reached a threshold for getting an excellent mark that would be in their transcript, they strived to perform excellently in the further assignments. Many wanted to receive 100 out of 100 possible».*

*«Those who are not performing well academically are nervous about the new system and try to undermine it coming up with different reasons. Some students do not show up at classes and do not do any required coursework or graded assignments. I am sure they will come one day in June asking what can be done – quick and –easy so that they pass the course. They don't realize yet that the rules have changed».*

Another recurrently emerging positive aspect of CA is a transparent and thought-through organization of a course. Faculty members invest more into the structuring of the course, alignment of expected learning outcomes with assignments and learning activities. Students welcome the transparency of a course structure. They like to know in advance weight of their assignments, sequence of them, and how the final grade will be calculated. It gives a perceived feeling of control over the process:

*«It helps to organize work for the semester for students and for me. I plan and think through the structure before a semester starts trying to match what I expect students to know at the end with the activities and assignments. It takes a lot of time, but then you can share with students a syllabus and they also will know*

*what we are trying to achieve working together. Knowing this final goal is very important».*

The interviews further reveal certain negative points. All the respondents point out that this system is more time-consuming. Not only does it take a lot of time to structure and prepare the course, but it also requires much time and effort to grade assignments and provide feedback.

Another point of concern is the structuring of the course so that it leads to expected learning outcomes. This challenge stems from the unpredictability of students' learning pace, as there is no information available in most cases on their prior knowledge. In addition, there are issues with the available number of classes per semester. Some of them can be cancelled, because of conferences or other activities organized by the university:

*«The four modules that I was planning to cover with students within this semester turned out to be an impossible plan due to the rather slow learning pace. I find it important that my students comprehend the material and have enough time to master skills before moving on to the next topic. So this semester I had to restructure my syllabus and limit it to only three modules».*

### 4.3.STUDY3

To support numerical data on students' experiences, which was analyzed in the survey, and to identify additional elements for analysis an interview with students was conducted. 10 respondents gave their account on the use of LMS Moodle and the system of CA. The interviews were conducted in Russian and rendered in English to support emerging patterns with participants' quotations.

In the use of LMS Moodle the dominating theme is their appreciation of the accessibility of course materials that reduces time searching for them, organizing them on your computer, revising information from previous classes. The issue,

however, that emerged in many interviews is that not all course instructors uploaded all the necessary materials:

*«Some teachers added on Moodle either some course materials and assignments or none at all. It would be way better if all materials from all courses were on Moodle».*

As a useful feature grades tracking is mentioned. It helped to monitor accumulation of points in courses and was easily accessible.

Concerning the system of CA the main theme is the reduced stress and anxiety. Through the gradual accumulation of points there is a control over your final grade:

*«In the final exams, I am always nervous. I was afraid that I would not be able to show how much I worked on the course and how many new things I learnt and mastered just because a I am bad performing in stressful conditions».*

*«The final exam is always a lottery; you either get a question that you are lucky with and can say a lot about it, or you get the wrong one and look like a person who got next to nothing from the course».*

The distributed, continuous work is described by respondents as a motivating factor.

*«I know that a chunk of theoretical material will be put into practice in some sort of assignment, which really helps me to comprehend it better, which by its turn encourages me to study even in those courses that seemed unappealing to me first».*

And finally the repeated claim is that it is beneficial to know what awaits in a course. It is estimated to be not only motivating, but also fair:

*«When I see it clearly written that after this module you will know this, after another module you will be able to do that, it helps me as I know where these classes are going. It helps me to be conscious and reflective about studying and to measure even without tests how close I am to the goal».*

*«I see it to be not very fair that I am doing a course and then three weeks before an exam I am given a list of things I have to know or told that now I should be able to do this. I wish I knew that from the start. Sometimes this list of “you have to know things” is too long and many of the topics were not covered in the course, and now I have three weeks and a million of other responsibilities».*

#### 4.4.DISCUSSION

The results of the current research go in line with the previous research findings that claim that CA reduces the anxiety level associated with assessment and makes room for a deep learning approach fostered by assignments requiring high order reasoning skills [Rust, p.149-151; Fry, Ketteridge, Marshall, p.125-137], has potential to decrease the attrition rate [Yorke, p.483-486], makes students more engaged [Rust, p.152], reinforces learning through feedback [Admiraal, Wubbels, Pilot, p.693-697]. The survey of the students indicates that the level of stress is significantly lower when CA is used, which is supported by the recurrent narrative indicating it in interviews. The same way it is found that tasks in courses with CA involve more analysis and creation, which are recognized as higher forms of thinking in comparison with comprehension and memorization in Bloom's taxonomy [Adesoji, p.293]. Although time limitations did not allow collecting data on the dropout rate following the introduction of the new system of evaluation, less frequent intention or thoughts of quitting a program there, can be seen as a valid sign of improved learning environment. The amount and quality of feedback was estimated as improved in CA for students. However, it never emerged in interviews as a significant factor affecting the studying process. The predictor of a more continuous work holds truth according to the results for students in good

academic standing and is still an issue to be resolved for those who are struggling students and are reported to resist the system of CA. This way all the identified in literature components of CA that improve learning environment prove to be valid by the current research as well. However, the discovered resistance towards it from the side of students in bad academic standing adds novelty to the topic and deserves investigation.

The hypothesis that students benefit from external levers that organize their work, mainly through the decreased reliance on willpower, proves to be right, which transpires not only from the survey, but also from interviews. The predictors of validation and gamification prove to be contributing to the learning outcomes, as faculty members emphasized enthusiasm of students to accumulate points even if they don't add any more to their final grade. It is indicative of emerging intrinsic motivation fostered first by tools and reinforcers identified as leading to extrinsic motivation. Such extrinsic motivation came with a warning of possible detrimental effects on learning. This has been disproved by the collected data, which means that external levers and reinforcers do not undermine learning but on the contrary can nurture a genuine interest and dedication that warrant a good learning environment. The predictor of the perceived feeling of the ownership of a course is mentioned as fostering learning both by the students and faculty members who appreciated transparency created by the system of CA coupled with an obligatory syllabus with the information on graded assignments. Participants emphasized confidence that knowing the plan of a course and clearly stated learning goals gave them. It can be seen that predictors not identified in the existing literature pertaining to CA are found to be factors supporting a learning environment that leads to improved outcomes.

One of the main adverse factors of CA is the reported increase of the workload. This study concurs with previous research and reports bigger workload both for the students and for the faculty. The survey results show that this increase is minor for students and it is not emerging as a point of concern in the interviews.



However, faculty clearly identified that it was a significant negative factor that needs to be resolved.

The predictors attached to the use of LMS Moodle are indicative of rather high level of satisfaction with its use among students. Access to files, grades, grades tracking, and links all from the same tool got positive reviews. However, it was not mentioned as a tool to avoid falling behind in case of illness or absence or to receive course announcements. It is indicative of the fact that faculty members refrained from resorting to these tools.

From the standpoint of the faculty, LMS Moodle was found useful for its file-sharing features, an opportunity to quickly make course-related announcements, and collect assignments. Other predictors, however, concerning quick grades communication, an opportunity to reuse structured courses, and use LMS Moodle as a tool for an emergency teaching modality were not singled out as recurrent themes. In addition, unlike the students, faculty members found a number of technical issues to be a hindrance in the use of Moodle, which is insightful for the project and shows the lack of robust and organized training which is needed to streamline it.

## CONCLUSION AND RECOMMENDATIONS

The project has been mainly successful. The big part of it that was not completed is the streamlining of the system of semi-automatic data collection with integrated early warnings system. I believe that all the infrastructure for it, ways of harvesting and analysis of data have been created. This part can become fully functional after minor additional training with the faculty members that will help to make reporting on students' attendance and academic performance unified.

The main goal of the project can be considered successfully completed, as the new system of assessment supported by the use of LMS Moodle has been launched and received massive support. The hypothesis of the thesis that introduction of the system of CA creates predictors of a system conducive to better learning outcomes is confirmed by the survey and semi-structured interviews. The faculty and students found all identified predictors to be enhanced in the system of CA in comparison with end-of-semester examination. The most prominent disadvantage of CA – increased workload – has been identified as an issue for the faculty. To resolve it, the university can reconsider number of contact hours allocated per professor working in CA or create a network of teaching assistants. The students see their workload as just slightly increased in courses with CA, and it does not emerge to be a problem that would call for any action.

LMS Moodle used to support the project has been welcomed by the students and received positive feedback, claiming that it is a tool that expedites access to learning materials and helps to track grades. However, some predictors associated with its use were not estimated by students in any way. The faculty found it to be a useful tool, but explicitly demanded more training in its use.

It can be summarized that the project has received unanimous support from the side of the students. However, the faculty members, although supporting it on

the whole, found certain hindrances. Even though the project is mainly aiming at create a better learning environment for students, dissatisfaction from faculty can undermine it. That is why concerns of faculty should be tackled and resolved.

This work expands the topic of CA by describing an identified resistance towards it from the side of students in bad academic standing. Moreover, the topics of willpower, validation, gamification, ownership of a course, and confidence are dissected in this work. They add to the topic of CA, as in works on it they are usually not singled out or given much attention.

To further test the system of CA for its validity in enhancing learning outcomes, the project needs to be scaled up and should become longitudinal. Consistent monitoring of levels of faculty and students satisfaction is necessary.

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