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## **ADAPTIVE SYSTEMS AS MEANS FOR IMPLEMENTING ANTHROPOCENTRIC APPROACH TO TRANSITION BETWEEN FORMATS**

The paper continues the research on the problems both educators and students experience while transferring between modes of instruction: traditional offline, online, mixed and hybrid formats. The factors are external and internal. The external factors, namely, pandemic period lockdown and later the geopolitical conflict involving more than two parties make it impossible for many overseas students to participate in face-to-face classes. Psychological adaptation and university's capacity to provide for a successful learning process in different formats are the internal factors. Research questions cover the following aspects: 1) students' expectations of different formats and problems they faced; 2) problems the educators faced; 3) research done previously; 4) solutions suggested; 5) feasibility of the proposed solutions. The findings based on thorough literature review, two surveys, and an expert interview<sup>1</sup> show that adaptive educational systems, despite being promising, are not likely to be implemented widely in the observable future. We argue that an anthropocentric approach to educational technologies and adaptive systems are not the solutions to the problems per se. These systems are a powerful instrument to provide for inclusive, comfortable and effective personalised education. The revised principles and key features of the new curricula for social sciences and humanities alongside implementation of adaptive systems can be the best solution in transition between modes of education.

*Keywords:* anthropocentric approach, distance learning, hybrid learning, adaptive educational systems, motivation.

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## **АДАПТИВНЫЕ СИСТЕМЫ КАК СРЕДСТВО РЕАЛИЗАЦИИ АНТРОПОЦЕНТРИЧЕСКОГО ПОДХОДА К ПЕРЕКЛЮЧЕНИЮ РЕЖИМОВ ОБУЧЕНИЯ**

В данном исследовании авторы продолжают изучать проблемы, с которыми сталкиваются как преподаватели, так и студенты при переходе от

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<sup>1</sup> The meeting was held via Zoom on 22/11/2022 at 14.00 Moscow time.

одного способа обучения к другому: традиционному офлайн, онлайн, смешанному и гибриднему форматам. Выявляются внешние и внутренние факторы. Внешние факторы — изоляция в период пандемии, а затем обострение геополитического конфликта — делают невозможным участие многих иностранных студентов в очных занятиях. Внутренними факторами являются психологическая адаптация студентов и способность университета обеспечить успешный процесс обучения в различных форматах. Вопросы исследования охватывают следующие аспекты: 1) ожидания студентов и проблемы, с которыми они столкнулись во время обучения различных форматах; 2) проблемы, с которыми столкнулись педагоги; 3) исследования, проведенные ранее; 4) предложенные решения; 5) осуществимость предложенных решений. Результаты, основанные на тщательном обзоре литературы, двух опросах и экспертном интервью, показывают, что адаптивные образовательные системы, несмотря на их перспективность, вряд ли будут широко внедряться в ближайшем будущем. Мы утверждаем, что антропоцентрический подход к образовательным технологиям и адаптивным системам сам по себе является средством, но не решением проблем. Эти системы являются мощным инструментом для обеспечения инклюзивного, комфортного и эффективного персонализированного образования. Пересмотренные принципы и ключевые особенности новых учебных программ по социальным и гуманитарным наукам наряду с внедрением адаптивных систем могут стать лучшим решением при переходе между различными форматами образования.

*Ключевые слова:* антропоцентрический подход, дистанционное обучение, гибридное обучение, адаптивные обучающие системы, мотивация.

## Introduction

The rapid progress in information technology, which might be overwhelming, paired with extreme changes in societal patterns on a global scale bring about serious challenges. These also affect tertiary education in terms of transferring the teaching and learning process, and most importantly assessment, from mode to mode: face-to-face, online, mixed (hybrid). Clearly, everyone involved has to adapt to a variety of timing patterns, communication patterns, test patterns, and changes in curricula and syllabi.

Previously we discussed the role of adaptive approaches to language instruction and evaluation of student progress [Golubeva & Rokhlina 2022]. We still keep the stance of supporting the value of humanistic (anthropocentric) approach and continue to investigate the role of adaptive educational systems.

The crucial point is to distinguish between LMS (learning management systems) and LXP (learning experience platforms) since only the

latter are adaptive systems per se. Such well known platforms as *Blackboard*<sup>2</sup>, *ЯКласс*, *Эквуо*, *Brightspace*, and *Moodle* are all examples of LMS, i. e. their role is to keep pre-loaded content, allow for grading simple tests (like multiple choice, or multiple matching) automatically. However, all the essays and other tasks involving students' creativity should be graded by hand. All the students of the class get the same level of difficulty at the same pace unless the teacher puts extra effort and assigns the tasks for more advanced learners to motivate them, for instance. *Moodle* is more flexible and allows to build in new modules compatible with the platform, which is why it can be adjusted to provide for adaptive courses.

The researchers of National Research University Higher School of Economics have published the evaluation of research on the effectiveness of adaptive systems. The empirical base was constituted by scholarly publications about the implementation and effectiveness of such systems in formal tertiary education. While generally the authors of this publication support the innovation, they point out that. Their criticism is grounded on the fact that analysed scholarly articles did not verify their claims with the results of statistical analysis, or randomised students grouping. Hence, it is not possible to draw conclusions about the effectiveness of adaptive systems education. Similarly, the correspondence between the amount of progress and adjustments of adaptive systems to learners' characteristics cannot be proven based upon the publications under study [Contemporary analytics, 2020]. The assessment criteria for student digital literacy should be established alongside the criteria to measure how adaptive systems paired with task-centred approach “motivate students towards self-directed learning” [Fedorova & Nikiforova, 2022, p.137]. The novelty of the reseach lies in the pursuit to verify the rationale for the use of adaptive systems in the framework of anthropocentric approach amid the variety of learning formats.

## Methods & materials

In the course of the research, we implemented both quantitative and qualitative methods: two surveys based on convenience samples, an expert interview, observation, and interpretation. The materials include technical and content (demo versions) information of adaptive platforms *Geekie*, *Knewton*, *Wiley Plus*, *Plario*, and *Smart Sparrow*.

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<sup>2</sup> We disagree with Khramova & Aleksandrova who put *Blackboard* together with truly adaptive systems such as *Wiley Plus* [Khramova & Aleksandrova, 2020].

## Results and analysis

First of all, we have to clarify the basic terms we use in this paper. Particularly, we have to distinguish between mixed and hybrid formats since in the literature we evaluated there are some included confusions. In mixed format the professor and a part of the group work in traditional face-to-face format while another part of students participate via online connection in real time. Hybrid format means that the whole group participates in traditional format (mainly, practical classes and seminars) and partly works synchronously/asynchronously online (mainly, lectures and tests).

The observation and comparative analysis of LMS (learning management systems) and LXP (learning experience platforms) demonstrated the differences presented in Table 1.

Table 1. Comparative analysis of LMS & LXP

core functions LMS	core functions of LXP
to provide space for the content	to provide space for the content
to keep the calendar of assignments	may be used as traditional LMS
to assign tasks and tests*	to diagnose students' level and build a track
to give statistics of each student's participation	modules can be integrated into the basic course
to keep each student's grades**	to guide student from easiest (acquired) to more difficult
the same level of difficulty for students in a group	level of difficulty is adjusted for individual student's needs
fixed deadlines	self-paced learning
to upload the content in the formats the system supports	to write content suitable for the course/module

\* Some types are graded by the system, some have to be graded by the teacher.

\*\* Technically both Blackboard & Moodle allow the dean's office to see students' results, however it depends on the institution whether this function is used.

The anthropocentric idea of personalised learning experience is the grounding principle of all LXPs under study. Not only the instructor's control is provided, but also the student's responsiveness is valued as the means for measuring the successful work of the system.

In the expert interview, D. Bubnov elucidated that initially adaptive systems, in our case *Plario*, were built to provide secondary schools in Eu-

rope (the Netherlands) with a tool for tutoring pupils with low grades, or to motivate advanced learners. That is to say, these systems were designed for independent students' work and extracurricular activities, the latter can be more effectively organised in online format [Zhabo et al., 2022].

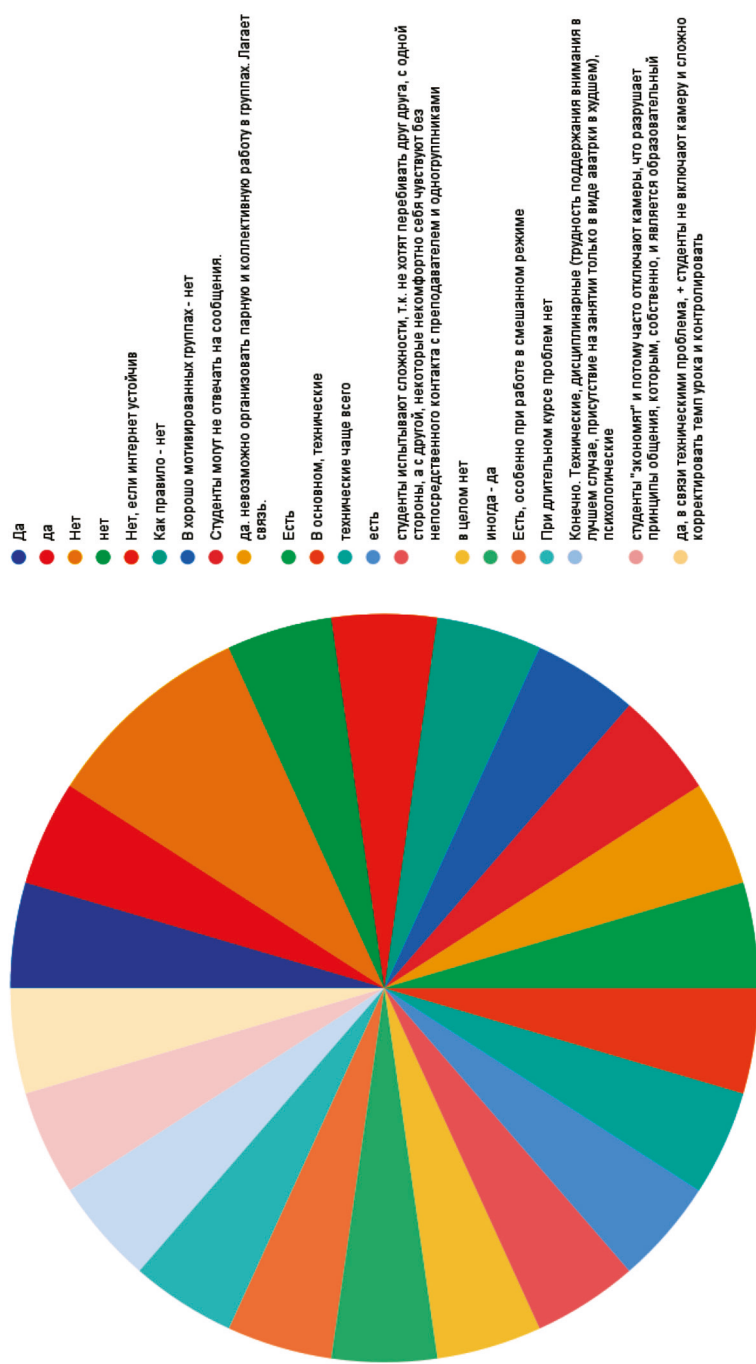
**Table 2. Characteristics of LXP under study**

Platform	Country	Language of interface	Key audience	Range of subjects
Plario	Russia	Russian	schools & universities	mathematics, chemistry, statistics
Geekie	Brazil	Portuguese	schools	
Smart sparrow	Australia	English	schools, universities, and corporate education	chemistry, anatomy, biology, mathematics
Wiley Plus	the USA	English	schools, universities, corporate education	accounting, economics, mathematics
Knewton Alta (a Wiley brand)	the USA	English	schools, universities, corporate education	biology, chemistry, physics, psychology, statistics

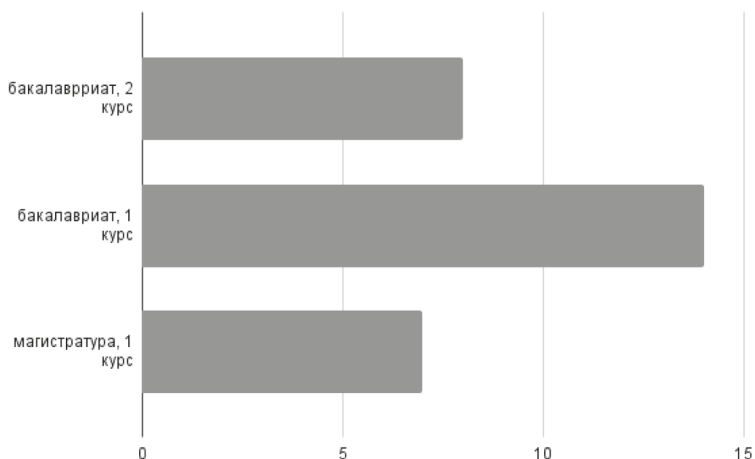
According to D. Bubnov, currently only five Russian universities use *Plario*, namely, National research Tomsk state university, Tomsk polytechnic university, Sechenov university, Higher school of economics, and Bryansk state technical university. The main advantage of *Plario*, as well as that of *Wiley Plus*, is that it provides for designing hybrid models integrated into university's LMS.

The results of the first survey elucidated that 100% of the teaching staff work in offline and online formats, and some of them work in mixed format. Apparently, teachers adopt methods and techniques to online format, yet some of them mentioned that methods they use hardly differ.

Interestingly, only five percent of the respondents claimed that they did not experience any problems with working in mixed format. The problems mentioned by the rest of the teachers can be distributed into three groups: technical, organisational and psychological. Technical problems include unstable internet connection, poor lighting, and the lack of equipment.



Picture 1. Problems in online (and mixed) formats



Picture 2. The respondents' general characteristics

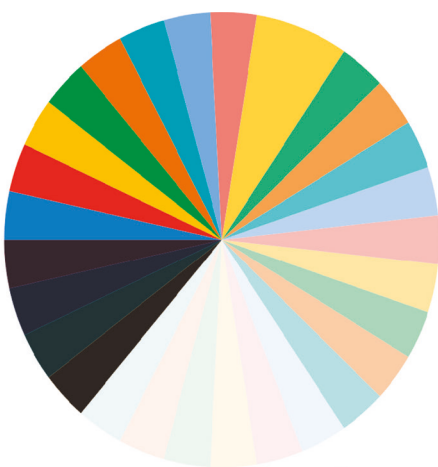
Another type of problems that should be considered is physiological type: one of the respondents reported cases of unsolved logopedic problems amongst students. In the course of the research, we have not received any data about difficulties which students with disabilities might encounter. The problems caused by technological issues are quite the same in online and mixed formats.

Quite expectedly, 63.4% of the surveyed said that they know nothing about adaptive systems. Among those who are familiar with the concept and know what is available only two respondents had practical experience with *Plario*.

The second survey revealed the expectations of the students and the problems they faced in transition between the modes of instruction.

The results demonstrated that personal psychological characteristics play an important role in the way students adjust to shifts in formats. For some of them online and mixed formats during the pandemic were uncomfortable, and they were looking forward to face-to-face classes. On the contrary, some students were quite satisfied with online format and felt uncomfortable in a big group of peers<sup>3</sup>. Among the responses two opposite views were expressed: 'the distance learning was better' vs 'having all classes face-to-face is a jackpot' (Pic. 3). However, most

<sup>3</sup> In 2020, the new English syllabus for Bachelor students was introduced at St. Petersburg University. Compared to the previous syllabus the number of students has increased dramatically: from max 14 to max 20. In reality, some groups account for up to 22 students. This has not been changed with the return to traditional face-to-face format. Master students continue to study in an online format.



- Лекционные занятия не поменялись, скорее стали более энергосодержательными
- Ожидания и реальность по большей части совпали: аудиторный режим в некотором роде дисциплинирует, кроме того, мне более предпочтительно общение в реальности, лицом к лицу. Видеокурс не может в полной мере воспроизвести такое общение.
- Ожидалась большая загруженность, а также то, что свободного времени станет гораздо меньше. В целом так и произошло, но также аудиторный формат настраивает на более продуктивную учебу, бордит и радует общением лицом к лицу не только с преподавателем, но и с товарищами по учебе
- Тяжело ходить на пары, лекционный материал сложнее слушать очно, но семинары нравятся при встрече
- Прошло только одно занятие пока, было всё хорошо.
- Немного неуютно находится в местах большого скопления людей и тяжело выводить из дома, представляя бесцельно потраченный час на дороге.
- Ожидания оправдались, аудиторный режим намного лучше
- В аудитории обучение намного эффективнее
- реальность
- Ожидания: все пары в очном формате, живое общение с преподавателями и студентами. Реальность: очень жаль, что английский в онлайн формате! Больше контактов с преподавателем, лучшее погружение в занятие
- Ожидала, что в аудиторном режиме преподаватели будут давать больше полезной информации. В реальности же некоторые все так же льют воду на лекциях, из-за чего хочется спать (даже, когда выспишься). На дистанционке действительно можно было бы отойти или уснуть, когда ожидается: интересные пары, проекты, работа в командах, необычные кейсы на парах, большая нагрузка, подспорное обучение. Реальность: многие пары неинформативны, командная работа присутствует
- Ожидала, что общение с одноклассниками и преподавателями в реальной жизни стимулируют меня больше учиться. Можно сказать, что так оно и произошло.
- Я хотела ходить в вуз, видеть живую своих преподавателей и однокурсников. Ожидания совпали с реальностью. Да, это сложнее, но намного
- Очень рада, что у нашего курса 100% очное обучение, это джекпот!
- Дистант был лучше
- Удобно, что есть доступ к информации в визуальном формате, например, презентаций. Как человек с приросшим к руке и голове телефоном ценю
- Ожидания совпали с реальностью (не по всем предметам)
- Ожидания были хуже, чем оказалась реальность. Все преподавателей преизрасно спешно, материал воспринимается в любом формате хорошо, никак их ожиданий не исполнили, но было приятно встретиться с товарищами по учебе
- очень хочется учиться оффлайн, в онлайн невозможно
- Все ожидания оправдались
- Ожидания о более эффективных занятиях в аудиторном режиме полностью оправдались
- меня радует аудиторный режим
- думал, что буду отпаляться и что это будет сложнее чем занятия в очной форме..... так и произошло
- все хорошо
- Ожидания оправдались, я знала как будет

Picture 3. Expectations vs reality: transition to face-to-face format



of them appreciated personal contact with their group-mates and the faculty.

The students mentioned such problems as spending too much time commuting, and as a result feeling tired, and not being able to have a decent lunch.

## Discussion

More than 70 years ago A. Turing introduced the concept of a learning machine and stated that at the end of the XX<sup>th</sup> century “general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted” [Turing A.M., 1950]. Then N. Wiener, R. Dawkins and some other scientists tried to include machines into the evolutionary chain guided by the idea of the similarity of information processing algorithms according to computer programs, with the thought processes that occur when humans receive similar information (computer metaphor). In 1981 G. Dejong introduced the concept of ‘Explanation Based Learning’, G. Hinton coined the term ‘Deep learning’ (2006). Though machine learning nowadays is considered to be “more appropriate to today’s digital reality and tomorrow’s digital prospects” [Saklofske et al., 2012, p. 312], the man, as a creative independent individual, is the centre of the technical process, and the machine is only the means.

Some recent publications [Khramova & Aleksandrova, 2020; Beriev & Alisultanova, 2021; Shershneva, Vainshtein, Kochetkova, 2018] have introduced the methodology of designing adaptive system modules. They mention building a learner profile as an essential element. Actually, this is in essence “needs assessment” (the term was coined by R. Kaufman for business organisations, and later on was adapted for educational institutions<sup>4</sup>). However, from the given explanation the “student profile” looks like a programme rather than a real human: the aforementioned authors did not give a clue about collecting student’s characteristics.

The analysis of a number of publications on the topic revealed some confusion of the terms ‘adaptive methods’ and ‘adaptive systems’. Adaptive methods have been used widely long before the pandemic and geopolitical restraints. Adaptive systems are LXP platforms operated with implementation of machine learning.

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<sup>4</sup> Guerra, I. and Rodriguez, G. (2005). Educational Planning and Social Responsibility: Eleven Years of Mega Planning at the Sonora Institute of Technology (ITSON). *Performance Improvement Quarterly*, 18(3): 56-64.

At present, in the market very few truly adaptive systems are available, amongst which only *Plario* is a Russian product. From the expert interview with the CEO Dmitrii Bubnov and the manager Evgeniya Krasnova of ENBISYS<sup>5</sup>, it became clear that adaptive systems are truly client-oriented, and the teachers' role in designing syllabi and content for the modules and courses is essential. The limitation of wide implementation D. Bubnov attributes to financial issues (one course costs about four million RUR) and time input required from the working group (about 3000 hours a year to build one course). According to him, there are two federal laws allowing universities to collaborate with ENBISYS in terms of designing courses in *Plario*. This means that legal regulations do not cause an obstacle.

In the context of Russian tertiary education, pioneers were teachers of mathematics at Tomsk University. Eventually, *Plario* has been probed by five universities on a limited number of disciplines, namely, mathematics, chemistry and programming.

Regardless of the type of LMS the universities use, the educators have to establish the criteria to evaluate the effectiveness of each type in terms of ROI. The workload of the working group designing and building modules, financial investment of the university authorities must be compatible with the outcomes: the quality of the course/module in terms of suitability, compatibility, prospects for demand on the market, and the level of satisfaction of the students and the teachers.

The variables to be measured are the following:

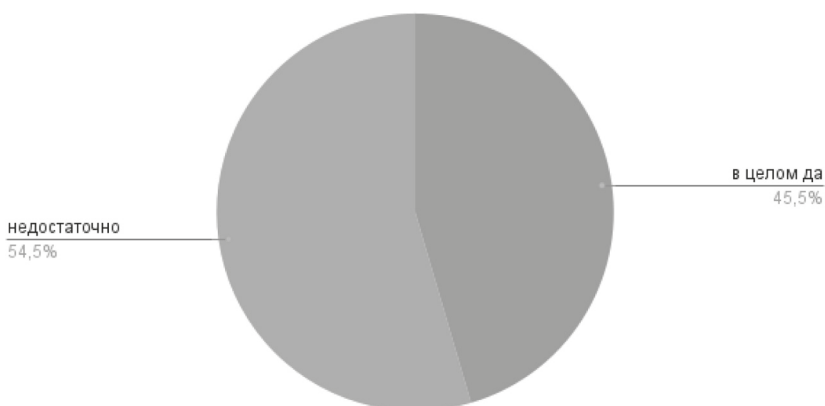
- the time spent on designing tasks and tests for each format;
- the time spent by students on accomplishing the tasks; the variety of tasks in each format;
- the proportion of time spent on independent work in adaptive system;
- proportional distribution of time dedicated to each mode of instruction;
- the growth of motivation (to be measured in collaboration with psychologists);
- the added value of students' progress.

Apparently, scaffolding as one of the instruments the humanistic approach uses to provide for individualised and comfortable learning has its limitations. It is more suitable for assigning corrective modules for weak-

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<sup>5</sup> ENBISYS has 10 years of experience of developing courses built on the platforms based on machine learning, initially for European schools (the Netherlands), and later on for Russian universities.

Являются ли курсы обучения эффективными? Помогают ли в практической работе на официальных платформах ВУЗа?



Picture 4. Effectiveness and applicability of training courses

er students, or creative and more challenging tasks for stronger learners. Both cases suggest independent work of a student. Nevertheless, the other side of the medal should not be forgotten: emphasis on learner autonomy, comfort and individual needs might lead to loss of important interpersonal skills, and form a false impression of making progress.

Another issue which defers the smooth transition to hybrid and mixed modes of instruction is insufficient or unsuitable training the teachers are given by their institutions. The survey revealed that more than a half of respondents are not satisfied with the courses on ICT (Pic. 4).

## Conclusion

Distance learning is an essential part of modern education that introduces considerable opportunities. The most prominent of these opportunities is hybrid learning. However, in the context of Russian tertiary education there is no data representing the percentage of hybrid learning in the curriculum of universities. The evaluation of skills loss caused by transition from mode to mode, levels of stress the teaching staff and the students experience, the degree of adapting techniques and communication styles has not been executed on a large scale.

Apparently, adaptive educational systems provide for individualisation of a study map, allow for customisation of resources and learning activities, and meet the unique needs of each student. Unfortunately, adap-

tive systems are not likely to be implemented widely. Despite the interest of enthusiastic educationalists, there is an obstacle called “institutional resistance” since “universities are by nature conservative entities” [Saklofske et al., p. 313]. Saklofske et al. said, “Sometimes putting a younger person in an office with decision-making power only means more energy is available to oppose meaningful change” [Saklofske et al, p. 314]. Moreover, legal and budgetary matters underlying formal tertiary education put strong restraint on incorporating adaptive platforms into a potential curriculum, which has to be re-designed particularly for social sciences and humanities [Fedorova & Nikiforova, 2022].

In our previous paper, we promoted the idea of implementing adaptive systems since they are flexible and client-oriented. This has a strong grounding supported in several publications [Sudeiskaya, 2022; Golubev et al., 2022;]. The interests and needs of all the parties involved (students, educationalists, university authorities, and system developers) should accord. The best “learning benefits these systems can provide when universities and companies collaborate” [Johanes & Lagerstrom, 2017, p. 7]. Nevertheless, the limitations must be taken into consideration. Johanes and Lagerstrom described the possible pitfalls of adaptive systems in terms of epistemology, costs, discrimination of certain learners via labeling, and excessive data flow [Johanes & Lagerstrom, 2017]. The technology per se is not the solution but only the instrument. The quotes from one of our respondents, who is familiar with *Plario* and *Miro*, supports this proposition. She noted that adjusting to different formats (for both students and educators), employing adaptation as an approach, and keeping up motivation depend not only on technologies but also on psychology.

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