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Upcoming high-stakes exams make students eager to choose effective learning strategies and classroom organization

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Abstract

This paper reveals how students' preferences for learning strategies covering different dimensions of the learning process, including mode of delivery, assessment, individual learning practices, and class organization, change over the time left until high-stakes exams are taken. We used data from the TICKS 2021 study covering high school students' preferences. Results show that the anticipation of upcoming high-stakes exams impacts students' preferences for learning strategies and classroom organization. As the exam date approaches, students increasingly prioritize effective learning methods, although not all the differences revealed in class organization attributes were found to be statistically significant. Secondary school students taking exams in the survey year indicated that they would devote an additional 3.9 hours per week to in-person learning over remote. Those with exams the following year would commit just 0.15 extra hours, while students with exams two years away would forgo 0.4 hours of free time to choose remote over in-person classes. Students closest to their exams were also willing to sacrifice twice as much free time to avoid group work and attend teacher-led classes compared to those with one more year left, and over three times more than those with two more years remaining. Notably, their preferences regarding external factors, such as the organization of classes, were more likely to shift than their preferences for their own learning practices.

Keywords: **Students' preferences, discrete choice experiment, high-stakes exams, learning strategies.**

Nadchodzące egzaminy końcowe skłaniają studentów do wyboru skutecznych strategii nauki oraz organizacji pracy w klasie

Streszczenie

Artykuł przedstawia, jak preferencje uczniów dotyczące strategii uczenia się, obejmujące różne aspekty procesu edukacyjnego, takie jak sposób dostarczania treści, ocena, indywidualne praktyki uczenia się oraz organizacja zajęć, ulegają zmianie w miarę zbliżania się do egzaminów końcowych. Wykorzystano dane z badania TICKS 2021, które obejmowało preferencje

uczniów szkół średnich. Wyniki pokazują, że perspektywa nadchodzących egzaminów wpływa na preferencje uczniów w zakresie strategii uczenia się oraz organizacji zajęć, choć nie dla wszystkich atrybutów organizacji klasowej ujawnione różnice są statystycznie istotne. W miarę zbliżania się terminu egzaminów uczniowie coraz bardziej skupiają się na efektywnych metodach nauki. Uczniowie, którzy przystępowali do egzaminów w roku badania, poświęciliby dodatkowe 3,9 godziny tygodniowo na naukę stacjonarną w porównaniu do zdalnej. Ci, którzy mieli egzaminy w kolejnym roku, poświęciliby jedynie 0,15 dodatkowej godziny, natomiast uczniowie, którym zostały dwa lata do egzaminów, zrezygnowaliby z 0,4 godziny wolnego czasu, wybierając naukę zdalną zamiast stacjonarnej. Uczniowie najbliżej egzaminów są również skłonni poświęcić dwa razy więcej wolnego czasu, aby unikać pracy grupowej i uczestniczyć w zajęciach prowadzonych przez nauczyciela, w porównaniu do tych, którzy mają przed sobą jeszcze jeden rok, oraz ponad trzy razy więcej niż ci, którzy mają dwa lata do egzaminów. Co istotne, większe prawdopodobieństwo zmiany mają preferencje uczniów dotyczące czynników zewnętrznych, takich jak organizacja zajęć, niż preferencje dotyczące ich własnych praktyk uczenia się.

Słowa kluczowe: **Preferencje uczniów, eksperyment wyboru dyskretnego, egzaminy o wysokiej stawce, strategie uczenia się.**

1. INTRODUCTION

As students' motivation levels fluctuate, influencing the effort they invest in learning, their preferences for learning techniques—which vary in terms of the engagement required and effectiveness—may also change. A factor that can influence students' extrinsic motivation to learn is exams. The proximity of final assessments can significantly shape students' motivational levels (Smith, 2004), thereby influencing the amount of effort they invest in their education, as well as their approaches to both learning and teaching strategies (Harlen et al., 2002; Kickert et al., 2022; Klein, 2016). As the awareness of impending exams intensifies, students' desire to achieve favourable outcomes may lead to a shift in their preference for more effective and targeted learning methods and forms of class organization. This article aims to verify whether such a phenomenon actually occurs. Past research indicates that students adapt their learning methods to the form of the exam (Iannone et al., 2020).

Using discrete choice experiment data from the Test for International Comparisons of Knowledge and Skills (TICKS), we analysed the utility students gain from various learning strategies and class organization, contingent on the time remaining before final exams. Our study focused specifically on techniques familiar to students, emphasizing strategies used by teachers—such as classroom activities and assessments—as well as individual learning methods. To evaluate how students prioritize different aspects of the learning process, we calculated willingness-to-pay (WTP), which quantifies the trade-off between free time and specific educational experience features. This approach avoids the biases often associated with Likert scales and offers a unique comparison between students' preferences and their academic performance in the context of the current understanding of learning strategy effectiveness.

2. LITERATURE CONTEXT AND HYPOTHESIS

An integral part of the educational process and common classroom practice, in addition to acquiring knowledge and competencies and developing critical thinking skills, is examinations. They not only set the standards for students and teachers but primarily measure learning outcomes and enable the monitoring of students' progress and the identification of learning deficiencies, which can serve as the basis for planned improvements in teaching (Jimaa, 2011).

From the students' perspective, exams can serve as a source of motivation for learning (French et al., 2024). The will to learn stems from a sense of deep meaning or purpose and can be described as a willingness to invest effort in the educational process (Harlen et al., 2002). Exam-type motivation should be classified as extrinsic motivation, in which students' behaviours are driven by external stimuli such as grades, awards, certificates or avoiding the consequences of failure, rather than internal interest and satisfaction from what students learn and the learning process itself (Yilmaz, 2017).

The level of motivation induced by any factor, including exams, depends on the personal meaning assigned to it, as well as the social context in which it is undertaken and the implications and consequences (Baumert & Demmrich, 2001). Research indicates that exams having an impact on academic status and career opportunities, defined as high-stakes exams, elicit a higher level of motivation compared to low-stakes exams (Barry & Finney, 2009; Boud & Falchikov, 2006; French et al., 2004; Knekta & Sundström, 2019; Penk, Pöhlmann, & Roppelt, 2014). An example of a high-stakes exam is final examinations, which are crucial in university admissions. Students perceive low-stakes exams as less important and exert less effort (Knekta & Sundström, 2019).

Higher motivation driven by high-stakes exams facilitates and enhances learning (Carless, 2017; Entwistle & Entwistle, 1991; Kickert et al., 2022). Numerous studies indicate that high-stakes exams contribute to improved student performance (Holme et al., 2010; Jürges & Schneider, 2010; Woessmann, 2005) and are even associated with better economic indicators such as earnings, unemployment rates, economic growth (Woessmann, 2018). Woessmann (2002) also found that the impact of high-stakes exams on student performance tends to intensify as students advance through secondary education.

However, some scholars (Caves & Balestra, 2016; Hansson & Riesler, 2022) challenge the notion that high-stakes exams significantly enhance students' educational outcomes. They argue that score improvements may stem from increased test familiarity and instruction tailored specifically to test-taking strategies rather than genuine skill and knowledge acquisition (Harlen et al., 2002; Jürges et al., 2012). Furthermore, exams serve as a motivational tool only for a subset of students and may be particularly effective for those anticipating success (Dawadi, 2020).

Jürges et al. (2012) note that the better results due to high-stakes exams come at the expense of students being less intrinsically motivated in school. This is because external rewards can weaken intrinsic motivation, thereby undermining preparation for lifelong learning (Deci, Koestner & Ryan, 1999; Hidi, 2000; Hidi & Harackiewicz, 2000; Harlen & Deakin Crick, 2003) and harm student self-regulation. Exams shift students' focus, even among the highest achievers, towards performance goals (grades) rather than learning goals, reinforcing extrinsic motivation over intrinsic motivation. Meanwhile, research highlights that intrinsic motivation is far more crucial in education (Ryan & Deci, 2000), as it fosters active engagement in learning and encourages students to pursue education both formally and informally, even when the external stimulus ceases.

The type of motivation can influence both the extent and quality of learning (Harlen, 2002). Research shows that high-stakes exams impact students' behaviour, teachers' practices, and the overall functioning of schools. High-stakes examinations motivate students to dedicate time and effort to exam preparation. However, students often focus solely on studying the content most likely to help them achieve higher grades (Williams, 2014). Moreover, they tend to adjust their learning strategies to match the exam format (Iannone et al., 2020; Zhan & Andrews, 2014), aiming to become familiar with the structure of assessments and develop test-taking strategies to improve chances of success (Harlen et al., 2002; Reay & Wiliam, 1999). Regarding learning strategies, Biggs et al. (2022) noted that during exam preparation, students prioritize traditional study methods, such as rote memorization or reviewing past exams, rather than engaging in application-based learning or adopting more meaningful and reflective study approaches.

High-stakes exams can have varying effects on students. According to Desalegn (2023), these effects may differ depending on students' proficiency in the subject. High-achieving students tend to be more persistent, employ more effective test-taking strategies, and have a more positive self-perception than their low-achieving peers (Harlen et al., 2002). Lower-proficiency students are more frequently engaged in non-test-related activities (Buyukkeles, 2016). Differences in the impact of high-stakes exams may also stem from students' family backgrounds (Woessmann, 2002).

Changes in students' behaviour and learning approaches may stem from students' personal choices but can also be shaped by classroom practices. Campbell et al. (2001) underline that teachers' instruction strategies influence students' perceptions and the learning approaches they use. In some cases, high-stakes testing leads to a shift toward test-centred instruction, where the primary focus is on improving exam performance rather than fostering deep understanding and critical thinking (Desalegn et al., 2023). Under the influence of high-stakes exams, teachers focus on exam-related content, adjusting the curriculum to align with exam requirements and adopting specific teaching styles (Harlen et al., 2002; Klein, 2016). Hammack & Wilson (2019) observed that instructional practices shifted before examinations, with teachers incorporating review games, flashcards, and drilling techniques into their lessons.

In summary, exams impact the amount of effort students put in, what they learn, and how they learn. The desire to do well among students may lead them to prefer and choose more effective and focused class organization and learning methods.

This research examines the potential impact of upcoming high-stakes examinations on students' learning preferences. All students are aware of final exams and their impact on future educational opportunities. Their level of motivation may fluctuate depending on the time left until the exam, which may be reflected in varying learning practices and preferences. This change may result from an individual student's choice or be influenced by changes in the organisation of classes before exams.

Given that students may place different values on exams, their impact on motivation and student behaviours and preferences may also vary, for example, high-achieving students with greater expectations for their future career paths may place more value on exams and be more inclined to adopt learning strategies that help them maximize their final exam scores and achieve their goals. Based on this, we formulated the following hypotheses:

Learning strategies hypothesis: As the time remaining until the final exam decreases, students become more inclined to choose more effective learning strategies.

Achievement hypothesis: Highest-performing students are more likely to choose more effective learning strategies as the final exam approaches.

In the following sections, these hypotheses will be tested by employing the discrete choice experiment (DCE) approach. As the statistical model, we use the multinomial logistic (MNL) model and the random parameter logistic (RPL) model as the framework.

3. METHODOLOGY

3.1. Data collection

To determine students' preferences, we used data collected as part of the TICKS 2021 – a yearly study conducted in Warsaw. TICKS is based on the Programme for International Student Assessment (PISA) and includes mathematics, reading comprehension, and science knowledge tests. The results of these tests are presented on the PISA scale. In addition to tests and questionnaires, the study incorporates a preference module using the discrete choice experiment (DCE) approach.

TICKS 2021 was conducted using a representative sample of Warsaw secondary school students. Only a selected sample of classes could participate in the study. The target population comprised students attending full-time, daytime secondary schools for youth, excluding special, hospital, and prison schools. The sampling procedure was designed to ensure that the sample accurately reflected the structure of Warsaw's secondary schools in terms of school type. A double-stratified random sampling approach was employed, incorporating proportional selection based on the number of students in class divisions within each school and cluster sampling at the school level. Stratification was applied based on school location and type. Due to the limited number of schools in certain districts of Warsaw, some districts were grouped to maintain statistical representativeness. Schools were drawn proportionally to the number of students enrolled in classes. Within each selected school, three classes were randomly chosen using simple random sampling. The data was collected in October and November 2021, when students had recently undergone remote learning, with some schools still using a hybrid model. In total, 5,006 students from 83 schools participated in the study. The study was available online; students took it in a school setting in accordance with the provided guidelines.

Although the study encompassed 2nd and 3rd-year students from secondary schools, technical schools, and vocational schools, only secondary school students are considered in the paper because of the different programs and exams taken by students from different school types. In Poland, vocational school students do not take final exams after completing the first cycle and are significantly less likely to continue further education. Secondary school students take only final exams, while students of technical secondary schools, in addition to final exams, have vocational exams. The lack of an exam in vocational schools and additional exams in technical schools may influence students' motivation differently depending on the type of school they attend and distort the results; therefore, we limit our study to secondary school students who take only the final exams. Therefore, the results cannot be generalized to all students.

The analysed sample, limited to secondary school students who completed mathematics tests and the entire DCE module (all choice situations), consisted of 2,815 students from over 90 classes. In our limited sample, 814 (28.92%) students were about to take the final exams in the school year of the study, 977 (34.71%) would take the final exams in 1 year, and 1024 (36.38%) in 2 years.

3.2. Choice experiment design

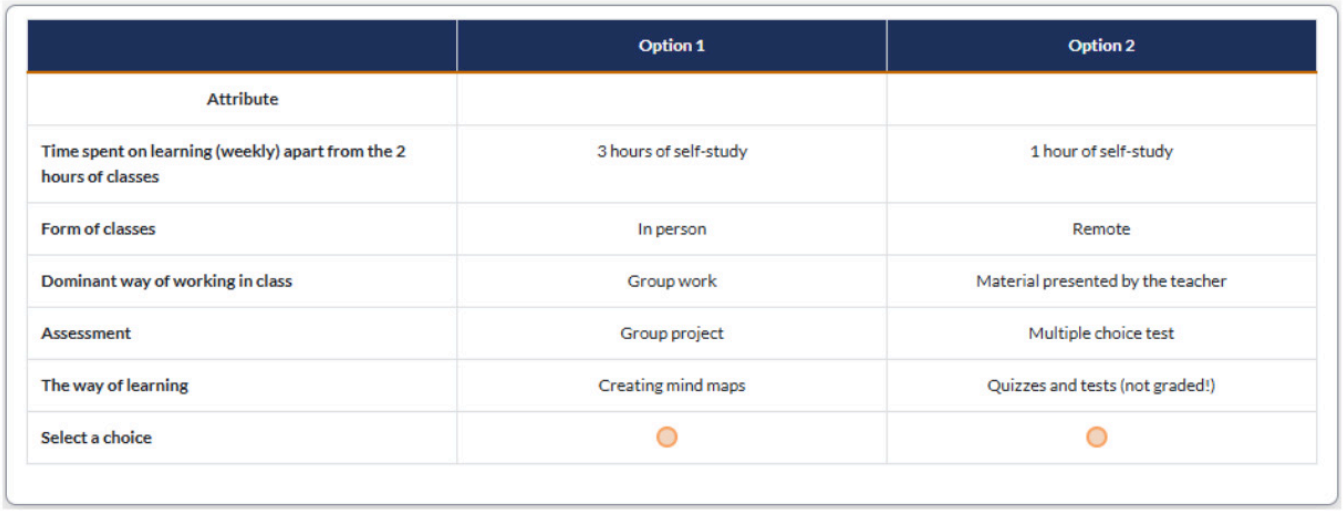
This study utilizes [DCE] to examine decision-making processes by assuming that individuals make rational choices to maximize utility (satisfaction) (McFadden, 1974). [DCE] is a stated preference method wherein respondents make choices in hypothetical scenarios described with a set of features with varying levels. Respondents evaluate trade-offs between features, where an increase in one attribute may be balanced by a decrease in another, keeping overall utility constant.

Each respondent faced a series of 8 hypothetical choice situations with two alternatives. In each situation, the students were asked to choose the preferred way of organizing the course they would attend in the next semester. A sample choice card is presented in Figure 1. The attributes used to describe the classes were derived from the existing literature (Agarwal et al., 2021; McDaniel et al., 2009; Raes et al., 2021) and included the mode of class organization, the dominant way of working during classes, the type of assessment, learning methods, and the time students spent on learning (weekly) apart from the two hours of in-school classes. The levels of these attributes are detailed in Table 1.

Table 1 ***Attributes and levels of [DCE]***

Attribute labels	**Levels**
Time spent on learning (weekly) apart from the 2 hours of classes	1 hour
	3 hours
	6 hours
Form of classes	In-person (reference level)
	Hybrid mode
	Remote
Dominant way of working in class	Material presented by the teacher (reference level)
	Group work
	Individual work
Assessment	Open question test (reference level)
	Multiple choice test
	Oral responses
	Group project
The way of learning	Studying the material from the textbook (reference level)
	Creating mind maps
	Quizzes and tests (not graded!)

Figure 1 ***Sample choice card***



	Option 1	Option 2
Attribute		
Time spent on learning (weekly) apart from the 2 hours of classes	3 hours of self-study	1 hour of self-study
Form of classes	In person	Remote
Dominant way of working in class	Group work	Material presented by the teacher
Assessment	Group project	Multiple choice test
The way of learning	Creating mind maps	Quizzes and tests (not graded!)
Select a choice		

To determine whether students' preferences shift over time and whether students become more inclined to select more effective learning and organizational methods before high-stakes exams, first, it is essential to identify which of the selected methods are more effective and contribute to higher student performance. The effectiveness of learning strategies has been extensively explored (Hattie, 2018). Based on research, we can identify which levels of attributes should be considered the most effective. Specifically, in the context of "the way of learning", quizzes and tests, which are forms of retrieval practice, are recognized as highly effective learning tools. This is particularly true when these practices are supplemented with feedback and repeated at intervals over time. They lead to improved learning outcomes and better retention of information (Binks, 2018). Most studies have demonstrated medium to large benefits from retrieval practice (Agarwal et al., 2021). Despite its growing evidence base, retrieval practice is infrequently implemented in schools compared to other strategies that are less empiricaly supported. In second place in terms of effectiveness are mind maps, notable for their ability to engage students with the material and require the establishment of detailed connections between concepts. They facilitate the integration of theory and practice (Machado & Carvalho, 2020), promote the development of critical thinking skills (Moattari, Soleimani, Moghaddam, & Mehbodi, 2014), and contribute to enhanced student learning outcomes (Dinarvand & Vaisi-Raygani, 2013; Hwang, Huang, Wang, & Zhu, 2021; Veronese, Richards, Pernar, Sullivan, & Schwartzstein, 2013). Research indicates that

students who employed mind maps in science classes achieved higher scores on subsequent tests compared to those who used standard note-taking methods (Abi-El-Mona & Abd-El-Khalick, 2008). However, the educational benefits of concept mapping may not surpass those achieved through simpler methods, such as re-reading the text (Karpicke & Blunt, 2011; Lechuga, Ortega-Tudela, & Gómez-Ariza, 2015). Regarding traditional learning strategies such as re-reading, note-taking, and verbal recitation, these methods exhibit the lowest correlation with performance on assessments (McDaniel et al., 2009). Wallace, Elliot and Rogge (2022) further demonstrated that re-reading does not have a positive predictive relationship with exam results.

Regarding assessment modes and perceptions of examinations, different formats vary in the required level of effort. For instance, open-ended tests and oral responses are generally much more demanding. Students typically prefer multiple-choice exams over essay-type questions (Struyven, Dochy, & Janssens, 2005). Van de Watering, Gijbels, Dochy, and Van der Rijt (2008) observed that students favour written tests, including take-home exams, papers, and projects, while they tend to least prefer oral tests, computer-based tests, and portfolios. Similarly, Sander, Stevenson, King, and Coates (2000) found that students preferred coursework assessments such as essays, research projects, and problem-solving exercises.

In the case of instructional formats, remote teaching has been deemed ineffective in some contexts (Mollah & Parvin, 2020). While purely online modes may lack efficacy, blended learning presents a promising alternative (Paudel, 2021). Hybrid classes, which integrate online and in-person elements, offer flexibility in time and space (Raes et al., 2022). Research indicates that students in hybrid instruction either perform comparably to those in face-to-face settings or excel beyond those in traditional or online courses (Bowen, Chingos, Lack, & Nygren, 2012; McFarlin, 2008).

When it comes to the dominant way of working in class, the literature does not clearly identify which instructional method is the most effective. However, it is important to note that individual work tends to be more demanding compared to the material presented by the teacher or group work.

3.3. Preference modelling

By examining the choices made by respondents, we assess the underlying utility linked to various alternatives. The analysis follows the random utility model (McFadden, 1974), where the utility U_{ijt} for individual *i*, choosing alternative *j* in situation *t*, is expressed as:

$$U_{ijt}=X_{ijt}\beta+e_{ijt}$$

Here, X_{ijt}, represents observed attributes, β is a vector of parameters, and e_{ijt} is the stochastic component capturing unobserved factors. If e_{ijt} follows an independent and identically distributed extreme value (type I) distribution, this leads to the multinomial logit (MNL) model, widely used for estimating utility parameters from observed choices.

However, the MNL model is limited in accounting for taste variations that are not linked to observable characteristics and does not handle unobserved factor correlations over time. To address these limitations, we also employed the random parameters mixed logit (RPL) model, which enables the identification of preference heterogeneity and potential correlations between alternatives and observed choices.

The RPL model accommodates systematic taste variation, capturing unobservable factors beyond those explained by observed characteristics. In the RPL model, we assume that all parameters, except for time, follow a normal distribution, while the time variable is kept constant. For the random parameters, we estimate both the mean and the standard deviations of their distributions, which reflect the diversity in individual preferences.

The parameters from the estimated models indicate preferences relative to reference attribute levels. The coefficients of the models do not have a direct interpretation; a significant positive coefficient signifies a greater likelihood of preference for the option compared to the reference level.

As the model includes time as a continuous variable, we computed the time equivalents for the preference parameters (WTP) to enhance interpretability. [WTP] represents the trade-off between attributes that students make when making choices. It is quantified as the ratio of an attribute's coefficient to the time attribute's coefficient, representing the respondent's willingness to trade their free time.

We start the analysis with the multinomial logit model (MNL) and the random parameter logit model (RPL) for all high school students participating in the study, and then we present the preferences depending on the time left until the exam and the students' results in mathematics.

4. RESULTS

4.1. General preferences

In Table 2, we present the estimates of the MNL and RPL models and [WTPs] for preferences for the whole sample derived from the RPL. The results of the models are consistent and lead to the same conclusions. Compared to the baseline levels, high school students have positive [WTP] for hybrid mode and negative [WTP] for remote mode, with in-person learning being a reference level. Students would be willing to forego 1.9 hours more of their free time weekly to have classes in hybrid mode and 0.68 hours to avoid the remote mode of education.

The positive attitude of students towards hybrid classes can be explained by the fact that this approach combines the benefits of in-person and remote mode (Mladenova et al., 2021; Nikolopoulou, 2022). Students value the hybrid format's flexibility (Baker et al., 2020; Muthuprasad et al., 2021) and the opportunity to interact with others (Raes, 2022). Fully remote classes do not provide students with sufficient levels of interaction with their peers (Sellnow-Richmond et al., 2019).

Students' preferences regarding learning strategies are as follows: they prefer learning by doing quizzes and tests or mind maps rather than studying material from textbooks. They are willing to spend 2.8 hours more learning by doing tests and nearly 1.2 hours more learning with mind maps to avoid studying material from textbooks. Regarding the dominant way of working in class, group work and individual work provide students with lower utility than having the material presented by the teacher. We can relate this to results by Hativa and Birenbaum (2000), showing that students prefer when the teacher is well-organized and provides for students' learning needs. This may suggest that students believe that classes conducted by the teacher are of higher quality or prefer to shift the additional effort to teachers.

Students show reluctance towards more engaging and demanding forms of testing knowledge. Their [WTP] expressed in relative terms is substantially higher for multiple-choice tests and group projects when referred to open-question tests. They are willing to forego respectively 5.4 and 3.4 hours more of their free time to be tested in these ways. At the same time, they are reluctant towards oral answers and prefer to prepare longer for a test with open questions. Multiple-choice tests are often seen as easier assessments, where high scores can be achieved with only a partial understanding of the material by employing certain strategies specific to the test format (Simkin & Kuechler, 2005). In addition, multiple-choice questions are used in high-stakes exams. Open-question tests require a higher order of thinking and deeper learning for constructed responses (Melovitz Vasan et al., 2018). Oral assessments generate more stress (Huxham et al., 2010), especially in a large group of students (Hazen, 2020), and unlike the other two assessment types, they are not used in final examinations for most subjects and are not considered during university admissions.

Table 2 ***Students' attitudes of high school students – MNL and RPL estimates***

Variable	MNL model	RPL model		
	Coefficient	Mean	SD	WTP (hours weekly)
Time spent on learning (weekly) apart from the 2 hours of classes	-0.08 (-0.00)***	-0.122 (-0.01)***		
Reference level: In-person				
Hybrid mode	0.14 (-0.02)***	0.23 (-0.04)***	1.00 (-0.07)***	1.91 (-0.33)***
Remote	-0.03 (-0.02)**	-0.08 (-0.04)**	1.60 (-0.05)***	-0.68 (-0.31)**
Reference level: Material presented by the teacher				
Group work	-0.21 (-0.03)***	-0.29 (-0.04)***	0.60 (-0.05)***	-2.40 (-0.32)***
Individual work	-0.10 (-0.03)***	-0.12 (-0.04)***	0.169 (-0.12)	-0.97 (-0.30)***
Reference level: Test with open questions				
Multiple choice test	0.43 (-0.03)***	0.67 (-0.05)***	0.31 (-0.15)*	5.49 (-0.44)***
Oral responses	-0.24 (-0.03)***	-0.46 (-0.04)***	0.93 (-0.06)***	-3.79 (-0.37)***
Group project	0.28 (-0.02)***	0.42 (-0.03)***	0.87 (-0.05)***	3.41 (-0.31)***
Reference level: Studying the material from the textbook				
Creating mind maps	0.06 (-0.03)**	0.14 (-0.04)***	0.49 (-0.08)***	1.19 (-0.31)***
Quizzes and tests (not graded!)	0.20 (-0.02)***	0.34 (-0.03)***	0.34 (-0.06)***	2.81 (-0.29)***
Constant	-0.04 (-0.02)			
Log-likelihood	-14669.95	-13808.99		
Number of observations	45040	45040		
Standards errors are in parenthesis.				
* p<0.1,** p<0.05,***p<0.01.				

The significant standard deviation parameters in the RPL model imply the heterogeneity of students' preferences. One of the factors differentiating students' preferences may be the time left until students take the final exams testing their knowledge.

4.2. Preferences of secondary school students at different intervals until the time of the final exams

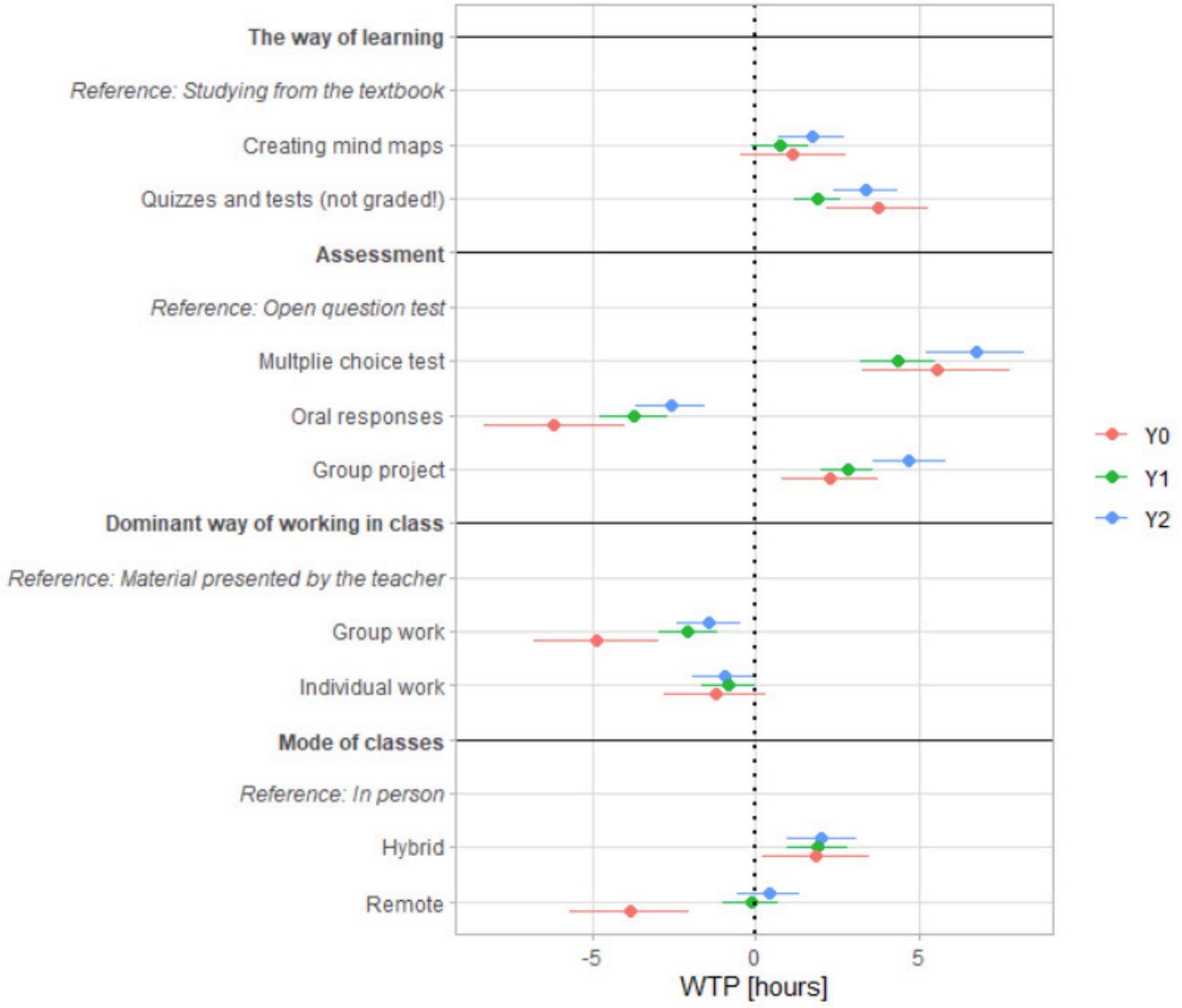
To examine how preferences vary by the time left until the high-stakes assessment is conducted, we ran three separate RPL models for students depending on the time they have until the exam. In light of the upcoming exams, which are the basis for university admission, students tend to choose more effective forms of class organization, with clearly distinguished preferences for in-person teaching among those students who will be taking the exam in the year of the study. In Figure 2 with the [WTPs] of high school students taking final exams in two (Y2), one year (Y1) and the year of the survey (Y0), respectively, only the last show a statistically significant reluctance to participate in classes remotely, compared to in-person classes (Figure 2). They would devote an additional 3.9 hours of their free time to in-person learning to avoid remote learning. The more time left until the exam, the weaker the preference for in-person classes. Students with an exam in a year's time would prefer to spend only 0.15 hours more per week to have classes in-person rather than remotely (the difference is not statistically significant). In comparison, students with an exam in two years would prefer to forego 0.4 hours more of their free time to have remote rather than in-person classes.

While the direction of preference for the dominant way of working in the classroom is the same regardless of the time left before the exam, Y0 present stronger preferences for classes with teachers presenting the material than their Y1 and Y2 colleagues. They would be ready to allocate twice as much free time to avoid group work (-4.9 hours) and have classes dominated by teachers' presentations than Y1 students (-2.1 hours) and over three times more than Y2 (-1.4 hours). Similarly, in the case of individual work, they are also willing to spend more time to avoid this form of work for classes where the teacher mainly presents the material. However, here, the differences are not significant. It is worth emphasizing, however, that for Y0 students, individual work provides the same utility as material presented by the teacher (no statistically significant differences), while Y1 and Y2 students prefer classes with the teacher presenting the material.

In terms of the way of learning, the link between the time left until the exam and choosing more effective ways of learning is less clear. While creating mind maps is more effective than studying material from a textbook, and taking quizzes and tests is the most effective way of learning among the analysed strategies, which is reflected in the students' choices, students taking final exams in the year of the study do not value these methods more highly compared to other groups of students (no statistical differences were revealed). Y1 students would be willing to devote 1.89 hours more of their free time to study with quizzes and tests and 0.76 hours to create mind maps rather than study material from the textbook. For Y0, this would be 3.74 and 0.15 hours, respectively, and for Y2, 3.39 and 1.72 hours. To summarize, those for whom the exam is the most distant and the nearest tend to spend time using more effective learning strategies. It is worth emphasizing that for Y0, there are no statistical differences between preferences for studying from a textbook and creating mind maps, while for Y1 and Y2, these differences occur in favour of mind maps (at 1% and 5% significance levels, respectively).

Regardless of the time remaining until final exams, the direction of students' preferences towards the assessment approach remains the same. However, we find that Y2 have a lower reluctance to oral responses and greater preference towards group projects and multiple-choice tests when referred to open-question tests, compared to Y1 and Y0; however, the difference is significant only between Y2 and Y0 for oral responses.

Figure 2 ***Students' attitudes depending on the time left to final exams – [WTP] based on [RPL] estimates***



The results suggest that students are willing to dedicate more time to studying to adopt some of the more effective strategies. This finding aligns with previous research, which indicates that the approach to exams can influence students' motivation and study practices (Harlen et al., 2002). However, the differences between students in relation to the time remaining until the exam are not significant for all aspects of class organization. Students primarily pay attention not to their own learning practices but to the external factors of class organization. This suggests that students rely heavily on the school to prepare them for their final exams, which is its responsibility; however, without adequate student involvement, the method of class organization itself may not yield the expected educational outcomes.

Further, we verified whether the time until the exam might affect students with higher and lower educational achievements differently. We estimated three RPL models, depending on the time left until the exam, interacting attributes with a variable defining whether the student was in the top 20% (representing highest performing students) or lowest 20% (representing the lowest performing students) from the math results in the TICKS assessment. The results of TICKS are more reliable and comparable than students' school grades. The interactions were included in the model as fixed parameters.

The results reveal some differences in preferences between the highest and lowest-performing students, confirming past research findings, which also underlined that high-performing students spent much time preparing for exams (Harlen et al., 2014; Pan et al., 2014). Among Y0, the highest-performing students were significantly more likely to prefer open-question tests than oral responses or group projects. Moreover, they preferred individual work over classes with the material presented by the teacher (significant at a 10% significance level). In the case of Y1 and Y2, no such differences were revealed between the highest- and the lowest-performing students. Concerning the mode of classes, regardless of the time left until the exam, the best students were significantly more reluctant to participate in remote learning than the weakest students.

Table 3 ***Results of RPL models with interactions in utility units***

Variable	Y0 Coef. (Std. Err.)	Y1 Coef. (Std. Err.)	Y2 Coef. (Std. Err.)
Time spent on learning (weekly) apart from the 2 hours of classes	-0.05 (0.02)**	-0.13 (0.02)***	-0.10 (0.02)***
Reference: In-person			
Hybrid mode	0.32 (0.14)**	0.27 (0.13)**	0.42 (0.14)***
Remote	-0.02 (0.16)	0.40 (0.13)***	0.51 (0.13)***
Reference: Material presented by the teacher			
Group work	-0.4 (0.14)***	-0.11 (0.13)	-0.12 (0.14)
Individual work	-0.25 (0.14)*	-0.03 (0.12)	-0.15 (0.13)
Reference: Open question test			
Multiple choice test	0.45 (0.18)**	0.41 (0.15)***	0.57 (0.15)***
Oral responses	-0.16 (0.15)	-0.43 (0.14)***	-0.31 (0.15)**
Group project	0.41 (0.13)***	0.42 (0.11)***	0.34 (0.11)***
Reference: Studying from the textbook			
Creating mind maps	0.27 (0.16)*	0.15 (0.13)	0.052 (0.14)
Quizzes and tests (not graded!)	0.44 (0.11)***	0.37 (0.10)***	0.285 (0.1)***
Interactions			
Time spent on learning (weekly) apart from the 2 hours of classes x top20	-0.06 (0.03)**	0.00 (0.02)	-0.03 (0.02)
Hybrid mode x top20	-0.18 (0.21)	-0.15 (0.19)	-0.26 (0.20)
Remote x top20	-0.70(0.23)***	-0.71(0.19)***	-1.09(0.19)***
Group work x top20	0.14 (0.20)	-0.25 (0.18)	-0.00 (0.2)
Individual work x top20	0.34 (0.20)*	-0.14 (0.18)	0.10 (0.19)
Multiple choice test x top20	-0.11 (0.261)	-0.08 (0.21)	0.19 (0.22)
Oral responses x top20	-0.46 (0.22)**	-0.04 (0.20)	-0.22 (0.21)
Group project x top20	-0.33 (0.19)*	-0.17 (0.15)	0.17 (0.16)
Creating mind maps x top20	-0.15 (0.22)	0.12 (0.19)	0.09 (0.2)
Quizzes and tests (not graded!) x top20	0.02 (0.16)	0.04 (0.14)	0.18 (0.15)
Standard deviation			
Hybrid mode	0.89 (0.18)***	-0.97(0.17)***	1.07 (0.18)***
Remote	1.63 (0.14)***	1.46 (0.12)***	1.42 (0.12)***
Group work	0.39 (0.17)**	-0.50 (0.12)***	0.72 (0.11)***
Individual work	0.22 (0.21)	-0.10 (0.30)	0.05 (0.29)
Multiple choice test	-0.47 (0.29)	-0.11 (0.28)	-0.08 (0.51)
Oral responses	0.69 (0.19)***	-0.93 (0.15)***	1.10 (0.16)***
Group project	0.87 (0.12)***	0.64 (0.12)***	0.75 (0.12)***
Creating mind maps	-0.64(0.17)***	-0.40 (0.18)**	-0.52 (0.17)**
Quizzes and tests (not graded!)	-0.00 (0.26)	0.04 (0.19)	0.37 (0.13)
Log-likelihood	-1585.40	-1934.45	-2006.09
Number of observations	5200	6256	6544
Standards errors are in parenthesis.			
* p < 0.1, ** p < 0.05, ***p < 0.01.			

The differences between the lowest and highest-performing students who take the exam in the year of the study may confirm that high-stakes tests do not motivate the unmotivated students, as stated in a review by Harlen et al. (2002), or motivate them to a lesser extent.

Assuming that actions align with preferences, higher-performing students may adopt more effective study methods before high-stakes exams than their peers with lower academic performance. As a result, they may improve their test-taking abilities, further widening the gap between high and low achievers. This raises important questions: how can we encourage the adoption of effective learning strategies, and what factors contribute to lower-performing students having weaker preferences for them? Is it a lack of awareness or lower expectations regarding their educational future, leading to a diminished emphasis on final exams? Teachers are the primary source of knowledge about learning strategies and play a crucial role in shaping students' behaviours and preferences (Beausaert et al., 2013). The teaching environment is responsible for changes in the initial learning approaches used by students (Struyven et al., 2006). Therefore, it is vital to prioritize the promotion of effective, rather than trendy, learning strategies among educators.

5. CONCLUSIONS AND IMPLICATIONS

In our discussion on students' preferences, the main concern is how students perceive learning strategies and course organization in light of upcoming exams. Research has shown that, indeed, students' preferences differ due to the time left until high-stakes assessments are conducted. However, these differences are significant only for selected features of the organization of classes and learning. The revealed differences may be caused by increased student motivation. The study results clearly indicate that the closer the exam is, the more students prefer in-person lessons, which allow for direct contact and improve interaction between students and the teacher. In addition, the results show that students with final exams in the year of the study do not note differences between studying from textbooks and creating mind maps.

Irrespective of the time remaining until final exams, students' preferences for assessment methods remain stable. However, among students with final exams in the year of the study, the highest-performing students are less likely to prefer oral responses and group projects than their low-performing peers. This may be due to the fact that they rather prefer methods adapted to the exam format. This would confirm the results by Iannone et al. (2020) as well as Zhan and Andrews (2014) that higher-performing students care about the results of final exams more and take actions that will familiarize them with exams and increase their chances of maximizing results.

Schools should foster a learning goal orientation and cultivate intrinsic interest in a subject, rather than focusing on a performance orientation. Meanwhile, exams can shift the primary purpose of education towards achieving high exam scores (Breault, 2000), which negatively impacts students' attitudes towards subjects, leading them to derive less enjoyment from learning (Jürges & Schneider, 2010). Exams can, at the same time, encourage the adoption of more effective learning methods. However, it is important to emphasize that students should use and benefit from such methods throughout the entire educational process rather than appreciate them exclusively before high-stakes exams. Final exams are not the primary purpose of education and should not overshadow the fundamental functions of the education system. It is essential to raise students' awareness and foster their ability to apply strategies and practices that will enable them to maximize the development of their knowledge and skills.

6. STUDY LIMITATIONS

The study and the methodology employed in it are associated with certain limitations. First, students' preferences may not necessarily reflect their learning practices. As the method places the student in a hypothetical situation, we cannot determine whether there is an actual change in students' behaviour before exams.

Second, preferences may not arise from students' recognition of more or less effective strategies but rather from their experiences and familiarity with specific learning methods and forms of class organization. Although Hativa and Bierenbaum (2000) indicate that students prefer approaches perceived as beneficial, even if they have not experienced them, Khalaf et al. (2020) underlined that students are more satisfied with strategies in which they have more experience. This emphasizes the teachers' role in shaping students' experiences and preferences. Moreover, there may be some discrepancies in the interpretation of certain terms and strategies referred to by the authors in the study, resulting from students' different experiences. For example, although all students experienced remote learning during the COVID-19 pandemic, the way of conducting classes and their quality could have been very diverse, which is why some students may have had slightly more and others less positive experiences.

Third, conducting the study during the pandemic, which significantly impacted the mode of education, could have greatly influenced students' behaviours and responses. The organization of classes, often inadequate, was new to students, potentially causing discomfort and shaping their preferences.

Last, the study was conducted on a representative sample of students from Warsaw; however, the sample used in the paper was limited to secondary school students. Therefore, the findings are not generalizable to other groups. Additionally, since

the data represent different cohorts, not the same students, at different intervals from the exam, we do not directly observe whether the preferences of the same students change over time.

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SUPPLEMENTARY MATERIAL

Appendix 1 ***Estimates of the RPL model.*** Supplementary data for this article can be found online.

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