Preference for Multiple Choice and Constructed Response Exams for Engineering Students with and without Learning Difficulties

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Abstract: Problem solving is a fundamental part of engineering education. The aim of this study is to compare engineering students' perceptions and attitudes towards problem-based multiple-choice and constructed response exams. Data were collected from 105 students, 18 of them reported to face some learning difficulty. All the students had an experience of four or more problem-based multiple-choice exams. Overall, students showed a preference towards multiple-choice exams although they did not consider them to be fairer, easier or less anxiety invoking. Students facing learning difficulties struggle with written exams independently of their format and their preferences towards the two examination formats are influenced by the specificity of their learning difficulties. The degree to which each exam format allows students to show what they have learned and be rewarded for partial knowledge, is also discussed. The replies to this question were influenced by students' preference towards each examination format.

1 INTRODUCTION

Public universities are experiencing budgetary cuts manifested in increased flexible employment, overtime working and large classes (Parmenter et al. 2009; Watts 2017). Public Higher Education Institutions are subject to pressures to accomplish "more with less". Technology is considered as a vehicle for cost effective interventions and university teachers adopt technology mediated solutions in order to do more with less (Graves, 2004). In that respect, they respond to the difficulties arising from big classes (Scharf & Baldwin, 2007) using computer-assisted assessment. Computer-assisted assessment (CAA) is widely used, usually in conjunction with multiple-choice (MC) and true/false questions, to make student assessment easier, faster and more efficient (Bull & McKenna, 2004). For constructed response (CR) or essay exams students have to construct their own answers, state assumptions, make interpretations and critically analyse the questions stated in the exam paper. Grading CR exams is a time consuming process and a computer-based evaluation of the answers is still problematic (Ventouras et al. 2010).

Assessment embodies power relations between institutions, teachers and students (Tan, 2012; Holley and Oliver, 2000). Paxton (2000) points out that MC exams disempower students because they are not given the opportunity to express the answer in their own words and construct their own solutions. Proficiency in a certain field is demonstrated with the selection of the correct answer, which has been predetermined by the tutor therefore, MC exam answers do not manifest the original effort of the examinee. MC exams reinforce the idea that original interpretations, and engagement in critical thinking are not expected by the students. By limiting the choice of options, MC exams disturb the power relation between the student and the assessor in favour of the latter (Paxton, 2000).

Although multiple-choice exams have become a popular way for assessment, students with learning difficulties (LDs) face particular problems with this

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examination format (Trammell, 2011). Extra time is an adjustment granted to students with LDs in order to ensure that differences in scores reflect different levels of learning and they are not influenced by student's speed to provide an answer (Duncan & Purcell, 2020). An optional oral examination complementing the written examination, is offered to students facing certain types of learning difficulties in order to assure that these students are not disadvantaged in relation to the rest of the students (UNIWA, 2020). The degree to which such amendments compensate for the effects of the LDs is still in question (Gregg & Nelson, 2012). MC exams require the exercise of faculties like memory and recall, text comprehension, managing cognitive distractions, holding information in short term memory for active comparisons in which students with LDs are rather vulnerable (Trammell, 2011; Duncan & Purcell, 2020).

2 THEORETICAL BACKGROUND

Issues related to MC exams like fairness, easiness, anxiety and performance have been the subject of numerous publications (Pamphlett & Farnill 1995; Núñez-Peña & Bono, 2020; Simkin & Kuechler 2005). Nonetheless, research on the preference and the attitudes of students towards MC or CR formats is rather limited (Gupta, 2016; Kaipa, 2020). In one of the first publications, Zeidner (1987) studied the attitudes and dispositions toward essay versus MC type exams on a sample of 174 students of the secondary education. The students were also asked to compare essay and MC formats along the following dimensions: relative ease of preparation, actual knowledge, expectancy of success, degree of fairness, degree of anxiety and overall preference for each format. The research concluded that MC exams are perceived more favourably compared to CR exams.

Similarly, Tozoglu et al. (2004), used a 30 item questionnaire to evaluate students' preference on the two examination formats along 10 dimensions: their experience with the two exam formats, success expectancy, knowledge, perceived facility, feeling comfortable with the format, perceived complexity, clarity, trickiness, fairness and perceived anxiety. In a recent survey 65.5% of the respondents expressed a preference for MC exams because they consider them to be easier to take and because they could guess better compared to CR exams (Kaipa, 2020).

The comparison between the two examination formats usually revolves around the questions of easiness, stress and anxiety, fairness, learning, constructing a solution or collecting an answer and guessing.

Easiness: Chan & Kennedy (2002) compared the performance of 196 students on MC questions and "equivalent" CR questions and found that students scored better on MC examination. According to Simkin and Kuechler, the question of easiness has rather to do with the perceived ability of the students to perform better on MC rather than CR exams (Simkin & Kuechler 2005, p.76). Another aspect related to easiness has to do with student's preparation. Schouller (1998) compared the studying methods and the preparation of the students for the two examination formats for the same course. The research concluded that students were more likely to employ surface learning approaches when prepared for a MC exam and deep learning approaches when prepared for an essay examination.

Emotional response: Anxiety in MC exams has been studied in respect to negative marking (Pamphlett & Farnill 1995), and more recently, as a relationship between math-anxiety and performance (Núñez-Peña & Bono, 2020). Students with high test anxiety have a positive attitude toward multiple-choice exams, while those with low test anxiety show a preference for essay exams (van de Watering et al. 2008). High levels of stress and anxiety are also experienced by students with learning difficulties when coping with MC exams (Trammell, 2011)

Fairness: Students perceive MC exams to be free of tutor intervention, therefore being more objective and fairer (Simkin & Kuechler 2005 p.4). Emeka & Zilles (2020) in their research found that students expressed concerns about fairness not in relation to whether they had received a hard version of the exam but in relation to their overall course performance. Students with learning difficulties face additional difficulties with MC exams, related to problems with short-term memory, reading comprehension and visual discriminatory ability (Trammell, 2011)

Surface learning: Entwistle & Entwistle (1992), in a qualitative research examined the nature of understanding that underlies academic studying and identified different types of revision studying which correspond to various levels of understanding. Preparation for the exams, studying and learning is influenced by the type of exam. Some research findings indicate that MC exams are related to memorization and/or detailed but fragmented knowledge, while CR exams are more closely related

to concept learning (Martinez, 1999; Biggs et al. 2001; Schouller 1998, Bull & McKenna, 2004).

Make learning demonstrable: Problem solving is central in STEM education (Adeyemo, 2010). Problem solving in Physics and Engineering proceeds in stages, therefore the number-answer is usually a poor indicator of student's abilities and learning. In this respect engineering students may feel in a weak position when they are given a problem in the form of a MC item, since they are not given the opportunity to make their knowledge demonstrable. In Engineering studies the construction of student's response is important not the answer itself (Gipps, 2005).

Express understanding in own words: Despite Paxton's findings that the students would have a better performance had they been asked to give the answer in their own words, Lukhele et al. (1994) concluded that CR exams, although more time consuming and of greater cost, provide less information on students' learning compared to MC ones. They found that CR or open-ended questions are superior when specific skills are assessed such as proficiency in algebraic operations, although both MC and CR formats demonstrated remarkably similar correlation patterns with students' grades (Bridgeman 1992).

The opportunity to give the correct answer by guessing: One of the drawbacks of MC examinations is answering by guessing, where the examinees can increase the probability for successful guessing by eliminating a number by distractors (Bush, 2001). This is one of the reasons hampering the wider employment of the MC examinations (Scharf & Baldwin, 2007). In order to alleviate this problem various strategies have been proposed (McKenna, 2018; Scharf and Baldwin 2007), including "paired" MC method (Ventouras et al, 2011; Triantis et al, 2014).

3 PROBLEM-BASED MC EXAMS

Problem solving is a fundamental part of studying physics and engineering (Redish, 2006). At a cognitive level problem solving comprises the phases of representation and solution (Duffy et al. 2020). It is a non-routine activity which requires visualization of images, understanding and interpreting information contained in images and text, further elaboration of given images, making valid assumptions and reasoning (Duffy & O'Dwyer, 2015). Mobilizing and synchronizing these abilities is a complex and time consuming process (Adeyemo,

2010; Wasis 2018) that goes beyond mere recalling, understanding and applying (McBeath, 1992). In problem-based MC questions the stem, which is usually accompanied by a visual representation e.g. a circuit, states the problem to be solved followed by the key and a number of distractors. The student solves the problem, finds the number-answer and then makes the proper selection among the options given. Problems demand mathematical computations and in the case of problem-based MC tests miscalculations can be disastrous. Assessment is done automatically on the basis of the selection of the key answer, while most of the student's work is not communicated to the assessor and therefore authentic effort is not rewarded.

A particular type of problem-based MC format was introduced in the course of "Electronics" during the academic year 2019-2020. Each test consisted of 5 to 8 items which evaluated students' competence in problem solving (Bull & McKenna, 2004 p.39). The stem described a problem in Electronics and it was usually followed by the figure of a circuit. The stem/problem addressed 1, 2 or 3 questions. Single question items asked the student to choose the correct answer between 4 options. Items addressing 2 or 3 questions were more demanding, since the questions were inter-related. For each question 3 options were given. Fig.1 shows an example of an item addressing two questions.
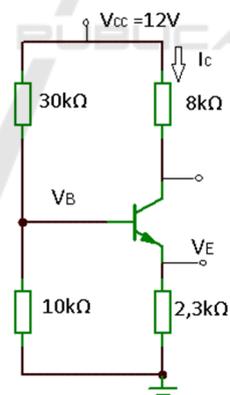
For the above circuit, choose the correct pair of values of the potential at the Base and the Emitter

V_B=2V	V_E=2,3V
V_B=3V	V_E=2,7V
V_B=4V	V_E=3,3V

Figure 1: Example of a problem-based MC item.

There was no negative marking (Holt, 2006), but the students who answered correctly all the questions of the individual item were given an extra bonus. Answering by inspection was practically impossible and the students had to solve the problem and then select the correct answers. An average of 5 min was allowed for each item, therefore a six item test lasted for 30minutes. The test format left a rather limited room for guessing especially if the student wanted to get the extra bonus.

Problem-based MC tests taken during the delivery of the course in "Electronics" allowed feedback for students and tutors and helped students get accustomed to the specific assessment format prior to the final examination. The grades of the MC tests contributed by 40% to the final grade of each student. Participation in the continuous assessment scheme was optional. Automated marking ensured timesaving, but the time invested before the examination increased considerably (Bull & McKenna, 2004). Computer assisted assessment provides the potential of administrative timesaving by automatically entering marks into student record system but this possibility requires an appropriate interface between the assessment and the student record system, which is not always available and thus the potential of administrative efficiency is not always realized (Bull, 1999).

Getting no marks because of miscalculations and depending heavily on the number-answer may generate feelings of unfairness, increased stress or perceived difficulty. The question of how the students evaluate the situation when they do not construct their own solution, and just select a number-answer was of particular interest in the research conducted.

4 COLLECTION OF DATA

The data were collected by means of an anonymous questionnaire administered to the students via the Open eClass platform, which is an Integrated Course Management System offered by the Greek University Network (GUNET) to support asynchronous e-learning services. The respondents were full time students of the Department of Electrical and Electronic Engineering, University of West Attica. The questionnaire was administered to 163 students who followed the course in "Electronics" during the academic year 2019-2020. Most of these students had already taken 6 MC tests during the delivery of the course (February 2020-June 2020). The tests were held as distance ones before the COVID crisis as well as after the university closure in March 2020.

The July and September (resit) 2020 examinations in "Electronics" were of the same format and they were held as distance ones. The students, who were familiar with the usage of the platform, were asked to complete the questionnaire. A total number of 112 students responded to the questionnaire. Before the publication, a pilot study was conducted to test its appropriateness.

The questionnaire collected information along two dimensions: 1) How students compare MC to CR exams in terms of anxiety, fairness and easiness, 2) How students perceive some of the characteristics of MC tests, namely: not asked to construct a solution, choosing an answer, not having the opportunity to express own view/solution to the problem and having the opportunity to give the correct answer by guessing. It also included demographic questions, regarding gender, age, number of MC exams taken and an additional item asking the students to report whether they face any learning difficulties. The last item included a "no answer" option.

A total of 105 valid answers were collected (17 women and 88 men). Eighteen (18) out of the 112 students who responded to the questionnaire self-reported to face some type of learning difficulty (15%), which is close to national-wide estimations (Mitsiou, 2004). For Greek students in the secondary education, the prevalence of dyslexia has been estimated at 5.5%, which is a number consistent with the data from other countries (Vlachos et al., 2013). The responses retrieved were those from students who had taken at least 4 MC examinations. The students were asked to evaluate the two examination formats along 10 questions replying on a 3-point scale. The questionnaire included one open-ended question: "Describe the positive or negative aspects of MC as compared to CR exams. Feel free to make any comments you like".

5 RESULTS

5.1 Preference, Easiness, Anxiety and Fairness

Preference: Among all the respondents a total number of N=105 students, (53%) expressed a preference for MC exams, 32% for CR exams, another 10% chose "any of the two" and 4 students did not answer this question. Figure 2 shows the preferences for the students who self-reported to face some learning difficulty (LD) and those who didn't (n-LD). MC tests are more popular among the students who do not face learning difficulties (57%), while the students

with learning difficulties expressed an equal preference for the two assessment formats (47%).

According to several publications, students prefer MC over CR exams (Kaipa 2020; Gupta et al. 2016; van de Watering, 2008; Tozoglu et al. 2004; Traub & MacRury, 1990; Birenbaum & Feldman, 1998, Zeidner 1987). Although preference for MC exams has been associated with perceived fairness, easiness and lower exam invoked anxiety, Traub and McRury (1990) have attributed this preference to students' belief that MC exam are easier to take and prepare for, and thus they tend to consider that they will get higher and presumably easier scores.
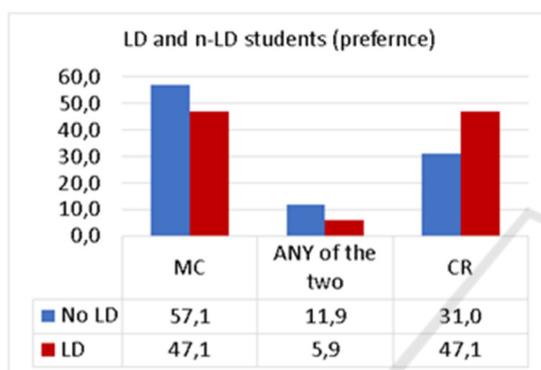

Figure 2: Preferences of students with and without LDs.

Easiness: Among the total number of the respondents (N=105) 25% considered MC exams to be easier compared to CR exams, 16% considered the opposite and 59% reported that MC exams are as easy as CR exams. For the students facing LDs a percentage equal to 41% found MC exams to be easier, while 35% of them considered the opposite. The majority (67%) of the students with no LDs expressed the view that MC exams are of the same difficulty as CR exams.

Fairness: The majority (56%) of the respondents expressed the view that MC exams are equally fair to CR exams. Only 9% of them replied that MC exams are fairer, while a percentage equal to 35% considered MC exams to be less fair compared to CR exams. For the students with LDs a percentage equal to 47% replied that MC exams are less fair than CR exams and another 24% of them held the opposite view. 79% of students who expressed a preference for CR exams consider MC exams to be less fair, while the vast majority (~83%) of the students who expressed a preference for MC exams consider them to be as fair as CR exams. Therefore, fairness is not a strong reason for the expressed preference for MC exams.

Anxiety: Only 30% of the respondents considered MC exams to be less anxiety invoking compared to CR exams, 22% expressed the opposite and another 49% of the respondents replied equal level of anxiety for both examination formats. For the students with LDs a percentage equal to 44% replied that MC exams are more anxiety invoking compared to CR exams and a percentage equal to 28% expressed the opposite view.

5.2 Selecting and Not Constructing the Answer

Five questions asked the students to express their views on the issues of control, expression of own ideas and feelings of empowerment or disempowerment. One interesting feature of the responses of the students is the polarity between the views of the students depending on their preference on the exam format.

Control: The majority of the students did not perceive as a problem not having control over the answer they submit. The percentage in the total sample was equal to 57%, it dropped to 44% for the students with LDs and it further dropped to 27% for the students with a preference for CR exams.

Constructing own solution: The majority of the students did not consider as a problem the fact that with MC exams they were asked to select and not to construct an answer. In the total sample this percentage was equal to 54% and it dropped to 50% for the students who reported LDs and it further dropped to 15% for the group of students with a preference for CR exams. On the contrary, among the students who reported no LDs and a preference for MC exams this percentage was as high as 81%.

Choosing between a number of given options: Our findings indicate that this feature of the MC exams is one of the most attractive to the students. A percentage equal to 64% of the total sample liked the fact that with MC exams they can choose between a number of given options. For the students facing LDs this percentage increased to 67%, while for the students with no-LDs and a preference for MC exams it was as high as 83%.

Relying on guessing: A percentage equal to 43% of the total sample reported to be less worried with MC exams because with some knowledge and a of bit luck they will manage to pass the exams. For the students with LDs this percentage was 39%, while the students with no-LDs and a preference for MC exams it was as high as 67%.

Making own learning demonstrable: A percentage equal to 48% of the total sample expressed the view that MC exams make them feel powerless because they cannot show what they have learned.

This percentage dropped to 44% for the students facing LDs and it derived its lowest value (23%) among the students who reported no-LDs and a preference for MC exams.

5.3 Qualitative Data

An overall percentage equal to 52% of the respondents provided answers to the free text question. For the students with LD this percentage was equal to 78%, for the no-LD students and a preference for CR exams, this percentage was 81% and it dropped to 42% for the students with no LD and a preference for MC tests.

5.3.1 Students with LDs

The students with learning difficulties showed an equal preference for MC and CR exams and one of them declared no preference. We received 7 text answers out of 8 students who self-reported to face learning difficulties and a preference for MC tests. The longer of these texts exhibited the problems usually encountered by students with learning difficulties, i.e. lack of clarity and problems with the organization of ideas. In their answers the students explained their preference for MC exams but they also made clear that they are struggling with this exam format as well. "MC tests is the best method for me. With CR exams, I lose marks because I cannot put in writing what I have in my mind. I need an examination format that will give me the opportunity to explain what I want to say". "With MC exams I can give an exact answer, text exams make me anxious because I cannot put in writing things I do know". "With text exams I'm treated unfairly, because my text answers do not make sense". Table 1 displays the issues raised by the students with LD and the respective frequencies.

Table 1: Issues raised by the students with LDs in the free text question.

Learning Difficulties		
	Preference	
	MC (8)	CR (8)
Incoherent writing	4	1
Time management	3	2
Difficulty to comprehend the stem and the options	1	3
Difficulties with MCs	3	-
Anxiety	3	0
Random answers	2	0

The problem of incoherent writing was the issue with the highest frequency among the students who preferred MC exams. Nonetheless, it must be noticed that 3 of these students said that they face difficulties with MC exams as well, but at least they don't have the problem of incoherent writing. Increased anxiety and poor time management during exams irrespectively of the examination format appears to be another serious problem. Two of the students reported difficulties in understanding the difference between the options given and in some cases difficulties with understanding the question itself. In such cases they reported to make random choices.

Students with LD and a preference for CR exams explained that their preference was based on their difficulty to understand the meaning of the question/stem or to tell the difference between the various options. Time management was another issue raised in two out of 6 quotes received from these students. Three of the students who expressed a preference for CR exams characterised MC exams as "good", "easier" and "helpful", meaning that with proper interventions, MC exams may become the preferred option for these students as well.

People with LDs such as dyslexia, experience educational and professional difficulties. During their studies they struggle with writing and reading and in some cases life satisfaction and sense of happiness decrease as well (Kalka & Lackiewicz, 2018). Students' quotes are in agreement with previous publications, which report that students with LD, in some cases, are characterised by weak skills which are relevant to MC exams. For example they may have difficulties with information processing and holding in short-term memory pieces of information for active comparisons (Trammell, 2011). Poorly designed MC questions have a negative impact on LD students' ability to select the correct answer. The findings of the free text question indicate that MC exams designed for students with LDs must contain less questions, less options per question and extra time must be given (Trammell, 2011). McKendree & Snowling (2011) reported that for mixed assessment type examinations, they found no indication of disadvantage for students with dyslexia. It appears that examinations of mixed format including MC, CR and oral examination, are more suitable for students with LDs

5.3.2 Students with LDs

The free text question was answered by 74 out of the 87 respondents who do not face learning difficulties. The issues raised are shown in Table 2
, together with the respective frequencies for the 48 respondents who expressed a preference for MC

exams and the 26 students who expressed a preference for CR exams. These issues were different compared to those raised by the students with LDs. More specifically they were related to: the time available to complete the examination (15/74), the shorter time required to complete MC exams (3/74), the nature of assessment in engineering courses (5/74), using the given options to check if the solution of the problem is correct (12/74), negative marking (4/74) and guessing in relation to the duration of the exams (5/74).

The issue mentioned most frequently was the duration of the exams. The students complained that the time given to complete their answers was too short. Looking at the literature one can see that an average of 1-1.5minutes is recommended. Although this time framework is considered adequate for MC questions answered by inspection, it is not enough for application type problem-based MC exams. Indeed, in some MC tests it was seen that students with a good overall performance, selected a wrong option in the last one or two items they answered, indicating that probably these choices were made at random. Whenever there were adequate indications for short duration of the exams, the marks were adjusted to make sure that the students were not treated unfairly. It appears that for application type problem-based MC questions the average time per item needed varies between 5 and 15 minutes depending on the complexity of the question. This issue was raised independently by 5 students who explained that whenever the time available was limited they made random choices.

Table 2: Issues raised by the students with no-LDs in the free text question.

No learning difficulties		
	Preference for	
	MC (48)	CR (26)
Not enough time	9	6
MCQ exams are shorter	1	2
Combined format	2	4
With MCQs you can confirm results	7	5
Negative marking	3	1
Solution is more important than answer	0	5
Forced to guess	2	3

Three students considered as a merit of the MC format the shorter duration of the examination. A two hours examination is tiresome given that in some cases students may have to take two exams in one day. Twelve students mentioned that with MC exams they can compare the results of their solutions to the

options given in the MC question and get an idea of whether their solution is correct. Some of the students who preferred CR exams, considered that MC format is not suitable for examining STEM courses. Their argument assumed that in STEM courses solution itself, not the number-answer, is what matters.

The students considered negative marking as unfair for a number of reasons: First, it increases anxiety, second the elimination of a distractor is time-consuming in itself and third, negative marking reduces the marks the student got answering correctly questions which assess another topic. As the students said: "There is no logic in negative marking because both of them (to find the correct answer and eliminate a distractor) take the same time". "Negative marking makes me anxious because a wrong answer will reduce the marks from the correct answers I gave". "I understand why negative marking has been introduced, but is it really necessary?", "I don't like negative marking especially when there are many options per item, it takes a lot of time to evaluate each one of them".

The students considered a mix of the two formats as preferable. This issue was raised by 6 students as a proposal to the problem of balancing between MC exams and their need to show what they have leaned. As one student said "I would like to have the opportunity to explain my choices but necessarily in all the questions"

6 DISCUSSION

The findings of this exploratory research give a snapshot of the attitudes and perceptions of the participants on the two examination formats. Students' preferences are mediated by the level of studies, subject examined, educational and cultural settings (Zeidner, 1987; Tozoglu 2004; Gatfield & Larmar, 2006). It is quite probable that the students would have reported different preference percentages or different levels of perceived anxiety, easiness and fairness had they been asked to answer MC questions in Electronics but not involving the solution of problems. It is also assumed that the sudden change from in-class to distance examination and university closure due to COVID-19 pandemic, have affected students' replies.

Level of test anxiety has been related to the preference towards the two examination formats: Students experiencing high exam anxiety tend to prefer the MC format, while those characterized by lower test anxiety tend to prefer essay exams (Birenbaum & Feldman, 1998). Overall, students

prefer exam formats which reduce anxiety (van de Watering et al. 2008). Zeidner (1987) reported that in his survey, 80% of the respondents judged MC exams to be easier, 56% to be more fair and 83% to invoke less anxiety. In a similar study Tozoglu et al. (2004) reported that 64% of the participants considered MC exams to be fair or very fair and only 28% of them viewed them as anxiety invoking. In the present study, it is seen that although the majority of the respondents (55%) expressed a preference for MC exams only a relatively small percentage of them consider MC exams to be easier (25%), fairer (9%) and less stressful (30%). Although in the findings of previous studies (Tozoglu, 2004; Zeidner 1987) MC exam preference appears to co-occur with high perceived easiness, fairness and less invoked anxiety, the findings of this study indicate that students may prefer MC exam although they do not consider this examination format as invoking less stress, being fairer or easier compared to CR exams (Table 3).

Table 3: Quantitative results by category.

MC exams are	LD(%)	no-LD(%)	Total (%)
Easier	41	21	25
Fairer	24	6	9
Less anxiety	28	30	30

Table 3 presents the percentage of the students who consider MC exams to be easier, fairer and less stress invoking compared to CR exams.

The low levels of perceived easiness, fairness and reduced anxiety for MC format, recorded in this study are possibly related to the following three factors: First, the data were collected during a period of strict social distancing measures due to COVID-19 pandemic (September 2020) when students were coping with distance examinations after a 3 months period of obligatory distance teaching. When assessment moves from face-to-face to distance, it becomes very difficult to ensure that students are not cheating (Rapanta et al. 2020). Some universities use available software to detect cheating and plagiarism during exams or assignment submission, while examination redesign has been proposed as an alternative option to minimize cheating (Munoz, Mackay, 2019). MC exams, beside other reasons, are used to prevent cheating. Version exams where each student answers a number of equivalent MC questions selected randomly from a bank of questions, gives rise to questions of fairness (Emeka & Zilles, 2020). Alternatively, the participants of this study received the same questions in a random order. This promotes external fairness (Leach, Neutze & Zepke, 2001) and makes cheating less probable. Setting stricter time

limits for the duration of the examinations was another measure suggested to prevent possible dishonest behaviours (OECD, 2020, p.3,5). Giving to the students a fixed amount of time to answer each question can preclude students from finding the answer from other sources or sharing their answers with colleagues (Ladyshewsky. 2015; Schultz et al. 2008). On the other hand, if the students feel that the time given to answer the exam questions is not enough may generate feelings of frustration, reduced fairness and increased anxiety. Increased stress, short duration and difficulty of exam questions are factors contributing to the negative experiences of the students related to distance examinations during the COVID-19 period (Elsalem et al. 2020; Clark et al., 2020).

Second, problem solving in Physics and Engineering is difficult. Presumably the students would have reported lower anxiety and higher easiness had they been asked to answer MC questions in Electronics not involving the solution of problems. For some students the solution of a problem takes longer compared to other students (Redish et al., 2006) and this may affect the perceived level of difficulty. Although the marks were adjusted to make sure that no student was disadvantaged because of the duration of the MC examination, the students did not enjoy the alleged easiness and reduced levels of stress which characterise MC exams.

Third, the specific type of problem-based MC exams left little room for guessing. One of the questions asked the students to rate the possibility of guessing. A percentage equal to 42% of the respondents considered that they would manage to pass the exams based on some knowledge and guessing while 42% disagreed. The respective percentage in Kaipa's (2020) publication was 77%. If students' preference for MC exams is influenced by the belief that with MC exams it is easier to achieve high scores (Traub & McRury 1990), low expectations for guessing may affect perceptions of easiness and anxiety.

Various publications have associated high preference for MC exams with high levels of perceived easiness, fairness or reduced anxiety (Zeidner, 1987; Birenbaum & Feldman, 1998; Tozoglu et al., 2004; Kaipa, 2020). Traub & McRury (1990) reported that students may prefer MC exams because they think they are easier to take and achieve higher scores. The findings of the present study show that fairness, easiness and reduced anxiety are not necessary conditions for preferring MC exams. It appears that "choosing between a number of given options" is the characteristic that loaded considerably

to the expressed preference for MC exams (64%). One cannot exclude the possibility that the students expressed a preference for MC exams based on reasons not included in this questionnaire or their preference was based on feelings of convenience i.e. instead of providing a detailed solution they just had to make some calculations, without stating assumptions or making explanations and then select an option. Birenbaum & Feldman (1998) found that students with a deep learning approach tend to prefer CR exams while students characterized as surface learners prefer MC format.

The data collected in this study identified two profiles among the students who reported no-LDs corresponding to the preference for each examination format: The first profile includes the students with no LDs and a preference for MC exams. These students do not perceive as a problem the fact that with MC exams they do not construct a solution (81%), or they do not control the answer the give (85%), they do not feel powerless if they are not given the opportunity to show what they have learned (69%) and they like the fact that with MC exams they can choose the answer between a number of given options (85%). The second profile, includes the students with no-LDs and a preference for CR exams. These students perceive as a problem the fact that with MC exams they are not asked to construct a solution (69%), they do not control the answer they give (69%), they feel powerless because they are not given the opportunity to show what they have learned (92%) and they don't like the fact that with the MC exams they have to select between a number of given options (58%).

It appears that the students interviewed by Paxton (2000) expressed views similar to those of the students who prefer CR exams in this study. Contrary to the findings of Paxton, the participants of this study showed a low interest in submitting original solutions and they didn't mind being choosers instead of solution creators. Only a percentage equal to 48% of the total sample expressed the view that MC exams make them feel powerless because they cannot show what they have learned. Discourse on student empowerment includes learners themselves and puts into perspective their willingness to get involved in decisions about teaching and assessment (Leach et al., 2001). In a more realistic approach, Holley & Oliver (2000) have broadened the scope of the power relations' discussion to include management. More importantly, power relations in universities are not exhausted in the teacher-student relations and are not instantiated during exams only. Texts, policies and discourses intervene in the power relations by making certain views official while silencing or omitting

others. As Luke points out this is a political selection that involves the valorisation of particular discourses, subjectivities and practices (Luke, 1995-1996, p. 36).

In the "marketized" university literature, MC exams is seen as the suitable assessment form to enable students get good grades in return of high student satisfaction scores in Student Satisfaction Surveys. In this way, the university records properly high levels of student achievement and high student/customer satisfaction (Watts, 2017), which enhance the university's attractiveness in the market and adds credibility to management's voice. The shift in authority from the professors to the managers has given rise to novel characteristics in contemporary universities. For example, a survey published in The Guardian (2015) found that "46% of academics said they have been pressurised to mark students' work generously". MC exams are not to blame for being easy or too easy. Problem-based MC exams, for example, are not perceived as too easy. According to our findings the majority of the students consider them as being equally easy (59%), equally fair (57%) and invoking equal (49%) or less anxiety (30%) compared to CR exams. Therefore, easiness is not a generic characteristic of MC exams. Nonetheless, even in cases when MC exams are not perceived as easy, the students still expressed a preference for them. The strongest reasons explaining this preference are: the opportunity to pass the exams by making the correct choices instead of constructing a solution (64%) and guessing (43%).

7 CONCLUSIONS

Problem-based MC exams is an objective type of examination suitable for engineering education. Students with learning difficulties showed an equal preference for MC and CR examination formats. From the replies given to the free-text questions it became clear that difficulties persist for both examination formats. Following Leach et al., (2001) it is concluded that students with LDs could have a role in an assessment partnership. The students with LDs are only a small percentage of the students and their difficulties affect not only exam results but also studying. Choosing a suitable examination format would make studying and preparation for the exams a more meaningful effort, while assessment would play a motivating role within and not outside the learning process.

The findings of the present study show that overall the participants prefer MC exams (55%) compared to CR ones. This percentage is much lower compared to

those reported in previous studies e.g. 83% by Zeidner (1987) and 65,5% by Kaipa (2020). The students perceive MC exams to be more or less equally fair, easy and anxiety invoking compare to CR exams. Choosing, instead of constructing the answer, was particularly popular among the respondents.

The students were also asked to express their view on the fact that with MC exams a great part of their work is not communicated to the assessor. The replies received were differentiated according to the preference towards the two examination formats. Students with a preference for MC exams liked the fact that they had just to choose an answer, they were not interested to show what they have learned or construct their own solutions to the problems stated in the MC exam questions. On the contrary, students with a preference for CR exams perceive as a problem the fact that with MC exams they are not asked to construct a solution and they do not control their answer, they feel powerless because they are not given the opportunity to show what they have learned and they don't like the fact that with the MC exams they are asked to select between a number of given options.

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