The effect of commen network problems on students academic performance in an elearning-Environment *

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Abstract. In the current light of the pandemic the worldwide use of eLearning-Software experienced an unpresented boom. We state the question how commen network problems influence the academic performance in an eLearning-Environment. To provide answers an online questionnaire with deliberate technical difficulties was constructed. Evaluating the performance of the test and controll group did not show any significant differences.

Keywords: eLearning · Online-Learning · academic performance.

1 Introduction

When trying to transfer an already existing method on a relatively new platform, it's important to know the things that come with being on such a platform and the possible influences those things might have on the method.

In day-to-day usage of online platforms and services it's not uncommon to face some issues, whether it's execution, connectivity and so on. E-Learning-platforms are not particularly different to those. Therefore, we want to discuss, in this paper, to which extent these problems can influence the test-results of being on such an 'issue-infected' platform in contrast to a well running platform with no issues.

We tried to focus on the most frequent issues we faced in our experience of browsing on different platforms, which are defined by HTTP-status-codes, like 400 (Bad Request), 401 (Unauthorized), 403 (Forbidden), 404 (Not Found), 408 (Request Timeout), as mostly being 'client-errors'.

2 Materials and Methodes

2.1 Preperations

The experiment was conducted by creating a software implementing Fig. 1. This software allowed the tracking of *technical problems* introduced by the software itself as well as the points and answers scored by each participant. Additianaly a room with an adequat number of computers with a fiber-connection to the server are needed, to rule out uncontrolled network problems. Half of the cumputers are manipulated and simulate the network problems with the use of the software.

2.2 Participants

The participants are students of the 5 grade and consist of two groups the controll group [CG] and the test group [TG]. Each group is made up by 50 girls and 50 boys for a total of 200 participants. It should be ensured that both groups prior to the experiment perform academicly similar, if not a comparison post experiment will be difficult.

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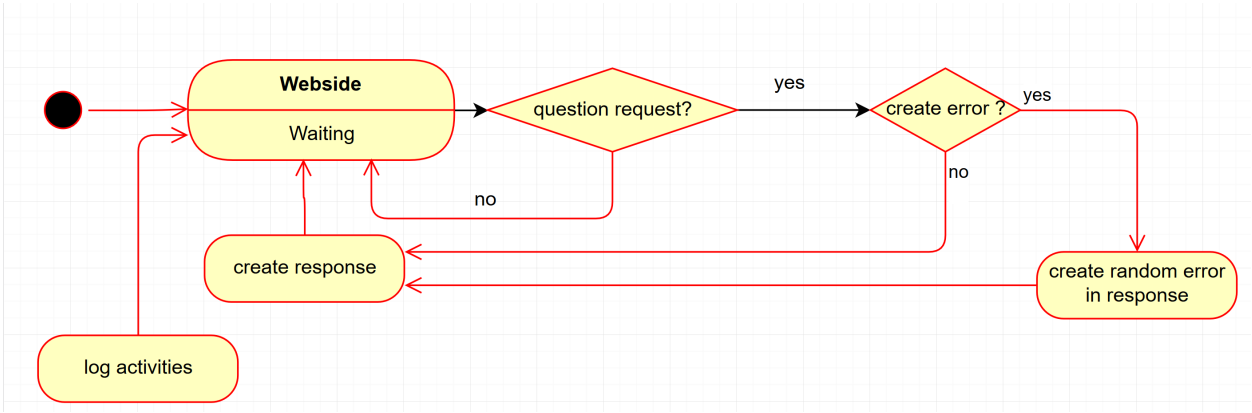

Fig. 1. A logic flow chart , representing how an implementation could operate. The black circle is the user interacting with the software. The webside would consist of two parts. A frontend handling user interaction and the creation of *bugs*. The backend responsible for saving the collected data and ensuring the frontend remains operationale.

3 Results

The results are displayed in chronological order of the analysis, there is no emphisis on the significans given by the order itself.

3.1 Controll Group vs Error Group

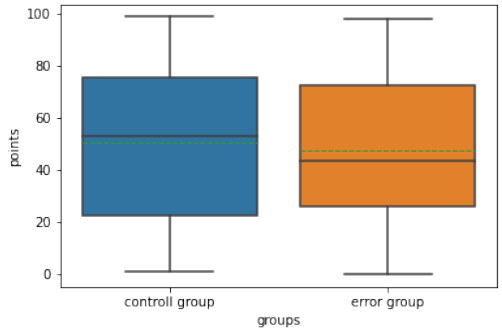

Fig. 2. The colored squares in the boxplot displays the upper and lower quartile of points earned by the controll group (50f/50m) and the error group (50f/50m).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 1. The calculated median, standart deviation and t, p-values for the controll group (50f/50m) the error group (50f/50m). The t,p-values were calculated by using a two-sided t-test.

	controll group	error group
median	53.0	43.5
standart deviation	29.278	29.826
t-value	0.728	
p-value	0.467	

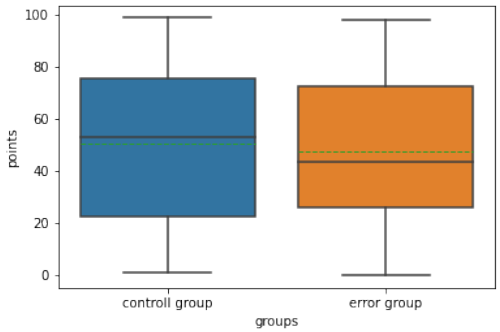

Fig. 3. The colored squares in the boxplot displays the upper and lower quartile of points earned by the controll group (50f) and the error group (50f).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 2. The calculated median, standart deviation and t, p-values for the controll group (50f) the error group (50f). The t,p-values were calculated by using a two-sided t-test.

	controll group	error group
median	55.5	40.0
standart deviation	27.85	30.933
t-value	0.949	
p-value	0.345	

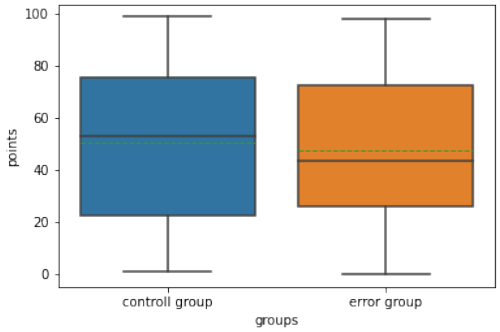

Fig. 4. The colored squares in the boxplot displays the upper and lower quartile of points earned by the controll group (50m) and the error group (50m).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 3. The calculated median, standart deviation and t, p-values for the controll group (50m) the error group (50m). The t,p-values were calculated by using a two-sided t-test.

	controll group	error group
median	52.5	50.5
standart deviation	30.638	28.495
t-value	0.08	
p-value	0.936	

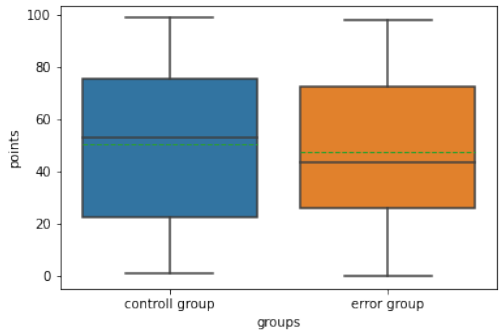

Fig. 5. The colored squares in the boxplot displays the upper and lower quartile of points earned by the controll group (50f) and the controll group (50m).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 4. The calculated median, standart deviation and t, p-values for the controll group (50f) the controll group (50m). The t,p-values were calculated by using a two-sided t-test.

	controll group(f)	controll group(m)
median	55.5	52.5
standart deviation	27.85	30.638
t-value	0.101	
p-value	0.919	

3.2 Controll Group Female vs Error Group Female

3.3 Controll Group Male vs Error Group Male

3.4 Controll Group vs Error Group

3.5 Controll Group vs Error Group

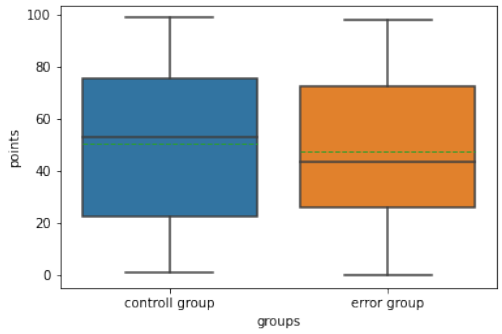

Fig. 6. The colored squares in the boxplot displays the upper and lower quartile of points earned by the error group (50f) and the error group (50m).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 5. The calculated median, standart deviation and t, p-values for the error group (50f) the error group (50m). The t,p-values were calculated by using a two-sided t-test.

	error group	error group
median	40.0	50.5
standart deviation	30.933	28.495
t-value	- 0.759	
p-value	0.45	

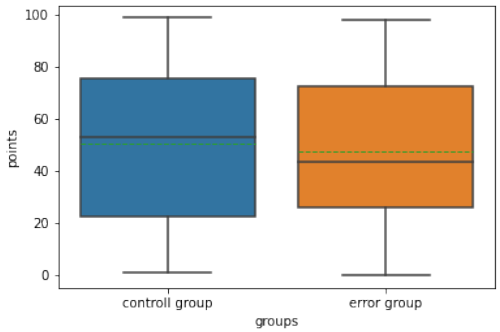

Fig. 7. The colored squares in the boxplot displays the upper and lower quartile of points earned by the controll group (50f) and the error group (50m).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 6. The calculated median, standart deviation and t, p-values for the controll group (50f) the error group (50m). The t,p-values were calculated by using a two-sided t-test.

	controll group	error group
median	55.5	50.5
standart deviation	27.85	28.495
t-value	0.19	
p-value	0.85	

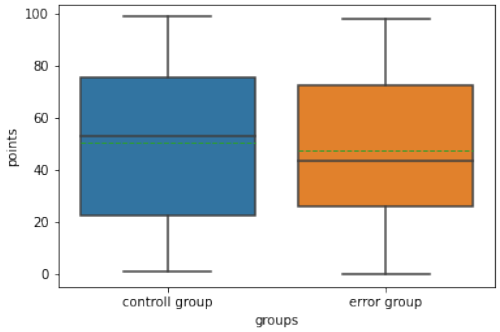

Fig. 8. The colored squares in the boxplot displays the upper and lower quartile of points earned by the controll group (50m) and the error group (50f).The green line marks the mean of all datapoints in the group. The gray line marks the median of the given group.

Table 7. The calculated median, standart deviation and t, p-values for the controll group (50m) the error group (50f). The t,p-values were calculated by using a two-sided t-test.

	controll group	error group
median	52.5	40.0
standart deviation	30.638	30.933
t-value	0.81	
p-value	0.42	