Managing Hybrid Learning with Large Groups during the COVID-19 Pandemic

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Abstract: This article aims to examine the effectiveness of hybrid learning with large groups. A cross-sectional study was conducted to answer the three research questions: 1) Is there a significant difference between the achievement of online and face-to-face students? 2) What are the main advantages and disadvantages of hybrid classes? and 3) What can be done to increase the effectiveness of hybrid classes? The research hypothesis is that there is a significant difference between the exam results. The mid-term and final exam results of both groups of students were compared through the independent and dependent t-test, which indicated there was no significant difference between the two groups.

Keywords: hybrid learning; university; achievement; large classes; pandemic.

1. Introduction

Prior to the Covid-19 pandemic outbreak, all classes at the International Balkan University (IBU), Skopje, North Macedonia, were held with physical presence. Although the spread of the infection will eventually be limited, extreme caution and scenario planning activities need to be undertaken to provide optimal learning experiences to students (Powell, 2021). In order to overcome the challenges of the Covid-19 pandemic during the academic year of 2021-2022 a hybrid educational mode was adopted, combining face-to-face (F2F) classes for local students with online classes for the foreign students. An additional reason for choosing the hybrid model was the fact that nearly two thirds of the IBU students are foreign students, mainly from the neighboring Balkan countries and Turkey.

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Several terms denoting a combination of classroom teaching and the use of ICT are often used interchangeably in research literature: "blended learning", "hybrid learning", "technology-mediated instruction", "web-enhanced instruction", and "mixed-mode instruction" (Martyn, 2003).

Nevertheless, there is a difference between the first two terms, which are most widely used, primarily at higher education institutions. Graham defined "blended learning systems" as learning systems that "combine face-to-face instruction with computer mediated instruction" (Graham, 2006: 5). Similarly, Doering says that blended learning environments offer 'a combination of online learning and F2F instruction'. (Doering, 2006: 198). The aim of the two methods is to complement each other (Poon, 2013). Hybrid learning is also a combination of traditional classroom instruction and distant schooling, but it focuses on 'optimizing achievement of learning objectives by applying the right learning technologies to match the right learning to the right person at the right time' (Graham, 2006). Students can choose whether they want to be present in class or join the lesson online. This means that teachers are teaching online and in the classroom simultaneously. In the case with the IBU students, the teacher and the local students had no choice – they had to be present in the classroom. Foreign students were allowed to choose and most of them decided to join remotely from their home country. Hybrid teaching methods rely on communication platforms, such as Zoom and Microsoft Teams. IBU utilizes the Zoom application for video conferencing, as well as various digital tools.

Hybrid courses differ from blended courses in that 'their online components are intended to replace a portion of face-to-face class time' (Siegelman, 2022). Classes are accompanied by online resources and tasks. Blended courses, on the other hand, provide students with opportunities for learning outside the classroom, i.e. online. Assignments, additional activities and projects are done online, in addition to classroom activities.

2. Literature review

Hybrid learning 'includes the reconceptualization and redesign of a course or program for delivery in a blended environment' (Meydanlioglu & Arikan, 2014). Hybrid courses are tailor-made as their design depends on the course goals and content, the students, the teacher, and the technology available (Garrison &Vaughan, 2007). The classes in hybrid courses may be shorter than traditional F2F classes. Course instructors replace some of the instructional time with online learning activities (Kurthen & Smith, 2005/2006). Several factors need to be considered in hybrid learning design: merging classroom teaching with technology-mediated learning; optimizing student engagement; and implementing user-friendly and cost-effective information technology and digital tools (Garrison & Vaughan, 2007; Mohawk Colleges). Course instructors should focus on effective use of time, space and interaction to maximize the effectiveness of hybrid learning.

Benefits and challenges of hybrid learning

Hybrid learning is ideal for students work and have families or live in remote locations. The flexibility also refers to teachers' freedom to constantly re-design and refresh course content in order to meet students' needs and various learning styles. Learners are autonomous and more responsible for their own learning. They are also encouraged to utilize online resources in innovative ways.

The hybrid model of teaching poses certain challenges for both students and teachers. The former need to develop their computer, study and time management skills, and learn to use their time rationally for performing synchronous and asynchronous learning tasks. They also have to make the transition from passive to collaborative learners, despite the lack of peer contact and interaction (Hamburg et al, 2003). The latter lack sufficient time to develop their skills in the use of sophisticated digital tools and pedagogy of online environments. Educators need adequate training to develop online facilitative skills, and policies need to be written and implemented (Prendergast, 2004).

Studies on the effectiveness of hybrid learning, conducted before the Covid-19 pandemic, have shown that it encouraged learners to seek information, evaluate it, share it collaboratively and, ultimately, transform it into their own knowledge (Dawley, 2007; Tanyeer, 2011, Poon, 2013). This mode of learning is particularly beneficial for introvert students, who are less inhibited, and thus interact more freely. Soliman (2014) conducted a study on the effectiveness of e-learning to develop EFL students' language skills and activate their independent learning. The study indicated that e-learning is an essential tool for enhancing the students' language proficiency and promote independent learning (Soliman, 2014). In another study, hybrid learning affected positively students' perceptions of an ESL writing course. Students became more autonomous and responsible for their own learning, and they also took ownership of the material (Larsen, 2012). Contrary to this, a study by Alshahrani& Ally shows that students believe that F2F learning is of higher quality and leads to better interaction between faculty and students. It is important to understand that limited (or no) training, software challenges, and lack of online infrastructure create additional challenges for teachers(Alshahrani& Ally, 2016).

Although tertiary education has been following the trend of hybrid learning for the last 20 months since the outbreak of the Covid-19 pandemic, there is lack of research on the effectiveness of the hybrid mode of teaching and learning, particularly whether one mode yields better results than the other does. Instructors need guidelines on designing courses for synchronous classroom and online teaching 'to enhance teaching and learning practices within academic settings' (Singth et al., 2021).

3. Research methodology
This study aims to examine the effectiveness of hybrid learning with large groups of students and how educators can combine F2F and online instruction to enhance students learning productivity.

A quasi-experimental design of a cross-sectional study with qualitative and quantitative elements was used to answer the following research questions:

1) Is there a significant difference between the achievement of online and face-to-face students?
2) What are the main advantages and disadvantages of hybrid classes with large groups? and
3) What can be done to increase the effectiveness of hybrid classes with large groups?

The research hypothesis is that there is a significant difference between the exam results of face-to-face and online students when studying English in large classes in a hybrid-learning mode.

Participants

68 first-year students from the International Balkan University participated in the study. The students came from the Faculty of Economics and administrative sciences, the Faculty of Law, the Faculty of Engineering, and the Faculty of Education. They came from several Balkan countries (North Macedonia, Montenegro, Serbia, Kosovo, Albania and Turkey). There were 44 female and 61 male students, aged between 18 and 35. Their level of English ranged between high A2 and B2, according to the CEFR for languages.

Research procedure

All students took the course in English language 1 during the fall semester of the academic year 2021-2022. They had 2 classes per week, for a period of 12 weeks. 32 students attended online classes regularly, while 40 were present in the classroom. The students took the written mid-term and the final exam in an online format. The results of the two exams of the F2F students and online students were compared in order to answer the first research question. At the end of the course, all students completed a questionnaire so that information on their opinion of the hybrid mode could be collected. After the final exam, the two instructors were interviewed on their experience and recommendations about the effectiveness of hybrid classes with large groups in an academic setting. The test and survey results were then analyzed using descriptive statistics and statistical tests. Qualitative data was collected from the interviews with the course instructors.

Instruments

Two summative tests were used in the middle and at the end of the course. The tests consisted of four sections: grammar (15 multiple-choice questions), vocabulary (15 multiple-choice questions), reading (10 multiple choice questions) and writing (a short essay question). Both tests had 100 points each. The SPSS v.20 software package was used to analyze the data through the two parametric statistical tests since the normality tests indicated there is normal distribution of data. There were 3 outliers from the online students and 10 from the f2f students: 8 students had 96-100 points on both tests, and 5 had below 40 on the mid-term and over 90 on the final exam, which leads to the

assumption that they probably cheated when taking the final exam. A dependent *t*-test was used to compare the median values of the test points from the mid-term and final exam for each group of students. The independent *t*-test was utilized to compare the mean values of the test results of the F2F students with the results of the online students. The $p<0,005$ was taken as statistically significant.

Two questionnaires were designed through Google forms to obtain data from students. The questionnaire for the online students consisted of 23 multiple-choice questions and the one for the F2F students included 24 multiple-choice questions. Descriptive statistics was used to analyze the data obtained from the surveys.

A semi-structured interview was conducted with the two course instructors.

Limitations

Due to the relatively low number of participants the results of the study are limited to the first-year students of the International Balkan University in Skopje, North Macedonia. The researcher could not control this factor as that was the total number of students who regularly attended classes and agreed to participate in the study.

4. Results and discussion

In order to answer the first research question and to test the hypothesis that there is a significant difference between the mid-term and final exam results of face-to-face (*M* = 74.03, *SD*= 17.373) and online students (*M* = 69,43 , *SD*= 14,892) and within each group separately an independent and a dependent *t*-test was used respectively. The results of the dependent *t*-tests for each group showed there is a statistically significant difference between the achievement of each group on the mid-term and final exam, as shown in tables 1 and 2 below.

The mean value increased from *M* = 74.5 (*SD* = 13.03) on the mid-term to *M* = 87.6 (*SD* = 14.14, *t* =-8.3, *p* = .000)on the final exam for the face2face students. It can be concluded that f2f students significantly improved during hybrid classes in large groups.

Similarly, the dependent *t*- test for online students indicated that the mean value of the final exam (*M* = 76.75, *SD* = 12.33, *t* =-3.91, *p* = .001) was significantly higher than the mean value of the mid-term exam (*M* = 71.17, *SD* = 13.12). This means that online students also improved significantly during hybrid classes in large groups. We may conclude that there is an increase in the test scores on the final exam of both groups, in comparison with their scores on the mid-term exam, and it is statistically significant.

The independent *t*-test was used to compare the mean values of the test scores of both groups. It indicates that there is no statistically significant difference between the two groups (*p* = .269, *t* = 1.117). Therefore, the main research hypothesis cannot be confirmed. Hybrid classes are as just effective for online students as they are for the f2f students. The f2f students showed greater progress than the online students because from the beginning the f2f showed a higher language proficiency (*M* = 74.5 on the midterm exam) than the online students (*M* = 71.17). Possible reasons for the progress

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of both groups could be the fact that class activities and homework assignments were tailor-made. The online students were given more online activities to compensate for the lack of interaction that f2f students had with their course instructors. Another reason could be students' motivation to study in general. Since the participants in the study are all first-year university students, it may be assumed their motivation is significantly high in the first semester of their studies. According to the interviewed teacher both online and f2f students generally did their homework regularly. Therefore, the progress they have made in the acquisition of English may not depend on the learning mode (f2f or online) but on other factors such as motivation, self-discipline and regular work.

Regarding the second research question, students completed a questionnaire on their opinions about the advantages and disadvantages of hybrid classes with large groups.

The results of the survey for online students indicate the following:

According to the results of the survey with the 29online students, the following statements can be made:

- 90% of the students attend online classes regularly, and only 10% miss a few classes;
- More than 70% of those who do not always attend classes do so for private reasons, and only 11% miss classes because of technical problems or because they prefer studying by watching the video recordings of the zoom sessions respectively;
- Nearly 80% prefer online to F2F classes;
- A third of the students chose online classes because they can save money on accommodation and transport, followed by health issues and combining work and studying;
- 40% think that the main advantage of online classes with large groups is interacting with the teacher by writing in the chat, thus avoiding the stress of talking in front of a large group of students. Other advantages include attending the Zoom meeting without being active, doing interactive online exercises, working in groups/pairs in breakout rooms, and chatting with the other online students and exchanging answers. Only 10% like the opportunity for watching the recorded lectures and studying at a time and place most convenient for them;
- The two main disadvantages are not being able to hear the teacher clearly and unstable internet connection in their homes;
- More than two thirds said that the learning mode does not affect their learning progress, that they communicate with the other students outside the online classes, and that the teacher regularly interacts with them during classes;
- Nearly all students answered they do their homework regularly;
- Half of them sometimes communicate with their course instructor outside classes via email, and the rest rarely contact their teachers in any way;

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- They all agree that the various course activities have a positive impact on their learning experience, and most of them find online classes motivating and think they help them become more responsible for their own learning;
- Over 70% think that the hybrid classes would be of better quality if they were online classes only and if the groups were smaller;
- The most common problems with hybrid classes with large groups are sound quality, followed by problems with the device. However, 25% said they experienced no problems during their online classes;
- Two thirds think the hybrid model is practical for teaching large groups and the classes are the right length, and the rest believe that it is not practical because the teacher has to focus on too many students, both in the classroom and online.
- Nearly all students would choose online classes in the future if they were given a choice.

The results of the survey with the 30 face-to-face students indicate the following:
- Most of the students attend classes regularly;
- Those who do not mainly miss classes because they work (50%), or because they find the material too easy (22%) or due to their health problems which make it difficult for them to wear a mask (17%);
- Two thirds of the students prefer F2F classes to online classes
- The greatest advantage of hybrid learning is being able to join classes online when they are sick or late for class, followed by the opportunity to interact with the teacher and students in the classroom, and having access to the recording of the class, which they can later watch and study on their own;
- The greatest disadvantage of hybrid learning in large groups is lack of communication between the teacher and all the students in the classroom and online, followed by not being able to hear the teacher clearly because of her wearing a mask or because of the technical problems she might have;
- More than half think they would make less progress if they had online classes only, and a third of them believe the mode of learning makes no difference;
- Nearly all the students do their homework regularly and communicate with the other students outside the classroom;
- Two-thirds interact with the teacher in the classroom in every class, but almost half of them rarely communicate with the instructor outside the classroom, and communication is typically done via e-mail;
- Nearly all students find the learning activities useful for their learning progress, and 80% are motivated to learn and feel that F2F classes make them responsible for their own learning;
- Over 60% complain that it is difficult to interact with the online students, but 75% think that the quality of teaching is not affected by having online students;
- 60% think that the classes would be more effective if the groups were smaller;

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- Over 70% believe that class duration is fine, and that the classroom is well-equipped for hybrid classes and there are rare cases of problems such as technical problems with the devices, the sound or unstable internet connection;
- More than half of the students find the hybrid model practical for large classes as the classrooms are not so crowded since some students are online. Approximately 30% think that online students cannot interact with the F2F students and the teacher needs to focus on the online students as well, thus neglecting those in the actual classroom;
- Finally, only half of them would choose F2F classes if they had a choice, and nearly 40% prefer the hybrid model where they decide when to join classes online or face-to-face.

Comparison between the groups demonstrates that each group is mainly satisfied with the educational model they follow. F2F students are more likely to choose the hybrid, i..e online learning if they were given a choice. Work was mentioned by both groups as a factor for lower class attendance. Both groups agreed that hybrid learning motivated them to study and take responsibility for their own learning. There are however studies that suggest that in-person learning provides motivation, helps in building a sense of community, and provides much needed encouragement to students (Kemp & Grieve, 2014; Paul & Jefferson, 2019).

The greatest advantages were flexibility of time and space, cost-effectiveness and self-directed learning. Both groups like the fact that hybrid learning enables them to study at their own pace, by watching the recorded Zoom meetings at a time and place convenient for them. The two groups mentioned sound problems as one of the greatest disadvantages of hybrid classes with large groups, as well as lack of communication between teachers and students and between online and F2F students. It is interesting to note that technical problems were no longer the main concern, although they occasionally disrupted the learning process. It can be concluded that the advantages of the hybrid model outweigh its disadvantages.

The interview with the course instructors provided some insight into possible ways of increasing the effectiveness of hybrid classes with large groups. Both teachers emphasized that it was difficult to maintain the sense of class community with the online students, which was not the case with those physically present in the classroom. They suggested additional short Zoom meetings with the online students only (at the beginning, in the middle and at the end of the semester) and one joint Zoom meeting with all the students. Another recommendation is to make it compulsory for the online students to have their cameras on to enhance the visual or eye contact. Finally, the visual field of the online students included the front section of the classroom, i.e. the teacher, the whiteboard and the smartboard. Having cameras showing the classroom from different angles would enable more visual contact between the online and the F2F students. This also allows teachers to notice nonverbal cues and make appropriate changes in the content and teaching methodology (Paul & Jefferson, 2019).The difficulties with managing a large class could be overcome if teachers have an assistant.

This would help the teacher a) to be present in two places at the same time (in the classroom and in cyberspace); and b) improve time and class management by enabling teachers/assistants to interact more with the students. Furthermore, both teachers agreed that hybrid classes should last shorter than traditional F2F classes for two reasons: a) teachers and students in the classroom have to wear a mask at all times and b) short asynchronous and synchronous online activities that increase the engagement of all students. Different parallel tasks could be performed with the online and F2F students to enable all students to be actively engaged in the lesson. Additional pair/group online activities could be done as homework assignments to increase interaction between online and F2F students, sinceF2F students cannot always participate in online activities for obvious reasons (having only a mobile phone, listening to the lecturer live).

5. Further research
The study showed there is lack of interaction between online and F2F students in large groups. Further research could be done on identifying ways of increasing student engagement during hybrid classes and designing or adjusting activities that could be used with both online and F2F students.

6. Conclusion
A hybrid approach to higher education seems to be the new normal as universities try to meet students' needs in the post pandemic world. The digital is as 'natural', 'real', 'authentic' and inherently entangled in our everyday learning interactions and experiences as non-digital forms of learning (Feenberg, 2009). We have to leave dichotomies such as physical-digital, onsite-online, synchronous-asynchronous, and behind and view learning technologies, tools and contexts as hybrid partners (Nørgård, 2021). The aim of this study was to investigate students and teachers experience of hybrid classes with large groups during the pandemic and to provide evidence-based practical solutions and recommendations for implementation of successful hybrid models of instruction in a university setting. Quantitative and qualitative data were collected from 59 IBU first-year students who attended classes in English language 1 for 12 weeks. The statistical tests revealed that both groups showed statistically significant progress, but that there is no statistically significantly difference between the final exam results of both groups. Consequently, the research hypothesis was not confirmed, and it can be concluded that the learning mode does not affect students' achievement. Both f2f and online students improved significantly. The survey and interview findings indicate that the advantages include flexibility in time and space, becoming autonomous learners and taking responsibility for their own learning. Technical problems and lack of interaction are the challenges to be overcome. Teachers suggest having assistants for better time and class management of hybrid classes with large groups, shorter classes and parallel activities for online and face-to-face students.

References

1. Alshahrani, Khalid & Ally, Mohamed (eds.) (2016). *Transforming Education in the Gulf Region:Emerging Learning Technologies and Innovative Pedagogy for the 21st Century*. Routledge.
2. Doering, A. (2006). "Adventure learning: transformative hybrid online education" in *Distance Education,* 27(2), 197-215.
3. Dawley, L. (2007) *The tools for successful online teaching*, London: Information Science Publishing.
4. Feenberg, A. (2009). "Postdigital or predigital?" in *Postdigital Science and Education* 1, 8-9.
5. Garrison,D.R.,Vaughan, N.D. (2007). *Blended Learning in Higher Education: Framework, Principles, and Guidelines*. First Edition. San Francisco-CA: Jossey-Bass. 2007,pp.5-6.
6. Graham, C.R. (2006) Blended Learning Systems: Definition, Current Trends, and Future Directions. In: Bonk, C.J. and Graham, C.R., Eds., *Handbook of Blended Learning: Global Perspectives, Local Designs*, Pfeiffer Publishing, San Francisco, 3-21.
7. Hamburg, A.,Lindecke, C., Thij, H. (2003). "*Social aspects of e-learning and blending learning method*s" in 4-th European Conference E-comm-LINE 2003, Bucharest.
8. Kemp, N., Grieve, R. (2014). "Face-to-face or face-to-screen? undergraduates' opinions and test performance in classroom vs. online learning" in *Front. Psychol*, 5, 1278. https://doi.org/10.3389/fpsyg.2014.01278
9. Kurthen, H, Smith, G.G., (2005/2006). "Hybrid Online face-to-face teaching" in *International Journal of Learning*, vol.12(5) pp.238-244.
10. Larsen, L. J. (2012) Teacher and student perspectives on a blended learning intensive English program writing course, Graduate Thesis and Dissertation Ames: Iowa State University
11. Martyn, M. (2003). "The hybrid online model: Good practice" in *Educause Quarterly: 18–23.*
12. Meydanlioglu, A. ,Arikan, F. (2014). "Effect of Hybrid Learning in Higher Education. World Academy of Science, Engineering and Technology" in *International Journal of Information and Communication Engineering* Vol:8, No:5.
13. Nørgård, R. T. (2021) "Theorising hybrid lifelong learning" in *British Journal of Educational Techno*logy, 52, pp 1709 – 1723. https://doi.org/10.1111/bjet.13121
14. Paul, J., Jefferson, F. (2019). "A comparative analysis of student performance in an online vs. face-to-face environmental science course from 2009 to 2016" in *Frontiers in Computers Science*, https://doi.org/10.3389/fcomp.2019.00007.
15. Poon, J. (2013) "Blended learning: an institutional approach for enhancing students' learning experiences" in *Journal of online learning and teaching*, vol. 9, no. 2, pp. 271-288.
16. Powell, A. (2021, February 25). *Vaccine can get us up to herd immunity, despite the variants.* The Harvard Gazette.

https://news.harvard.edu/gazette/story/2021/02/vaccines-should-end-the-pandemic-despite-the-variants-say-experts/.

17. Prendergast, G. (2004). "Blended collaborative learning: online teaching of online educators" in *Global Educator*, pp. 2 -8

18. Siegelman, A. Blended Learning, Hybrid Learning, The Flipped Classroom… What's the Difference? (2022, January 10). [Blog post]. Retrieved from https://teaching.temple.edu/edvice-exchange/2019/11/blended-hybrid-and-flipped-courses-what%E2%80%99s-difference

19. Singth, J., Singh, L. & Steele, K. (2021). "Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for COVID-19, Post Vaccine, & Post-Pandemic World" in Journal of Educational Technology Systems. Volume: 50 issue: 2, page(s): 140-171. https://doi.org/10.1177/00472395211047865

20. Soliman, N. (2014) "Using e-learning to develop EFL students' language skills and activate their independent learning" in *Creative Education*, vol. 5, pp. 752-757.

21. Tanveer, M. (2011) 'Integrating e-learning in classroom-based language teaching: Perceptions, challenges and strategies', Conference Proceedings, 4th International Conference ICT for Language Learning, Florence, Italy. The University of Central Florida. (2015) Benefits of blended learning, [Online], Available, http://blended.online.ucf.edu/about/benefits-of-blended-learning/ [10 Jan 2022]

22. Vaughan, N., Garrison, D.R. (2005). "Creating cognitive presence in a blended faculty development community" in *Internet and Higher Education*, 2005, vol.8(1), pp.1-12.

23. E-learning services & Mohawk colleges. Blended Learning. available at: https://elearn.mohawkcollege.ca/shared/Documents/InfoSheets/ Blended_Summary.pdf (January 10, 2022)

Table 1: dependent *t*- test for online students

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	71.1724	29	13.12051	2.43642
	posttest	76.7586	29	12.33941	2.29137

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	29	.819	.000

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	pretest - posttest	-5.58621	7.68820	1.42766	-8.51064	-2.66177	-3.913	28	.001

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Table 2: dependent *t*- test for face-to-face students

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	74.5000	30	13.30997	2.43006
	posttest	87.5667	30	14.14136	2.58185

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	30	.803	.000

Paired Samples Test

		Paired Differences							Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	
Pair 1	pretest - posttest	-13.06667	8.66198	1.58145	-16.30110	-9.83223	-8.262	29	.000

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
										95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper	
pretest	Equal variances assumed	.002	.964	1.117	56	.269	3.86207	3.45789	-3.06492	10.78906	
	Equal variances not assumed			1.117	55.997	.269	3.86207	3.45789	-3.06493	10.78907	
posttest	Equal variances assumed	.113	.738	3.438	56	.001	11.68966	3.39996	4.87872	18.50059	
	Equal variances not assumed			3.438	55.534	.001	11.68966	3.39996	4.87746	18.50185	

Table 3: independent *t*- test for online and face-to-face students

Group Statistics

	group	N	Mean	Std. Deviation	Std. Error Mean
posttest	1	37	74.03	17.373	2.856
	2	30	69.43	14.892	2.719

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