

King Fahd University of Petroleum and Minerals (KFUPM)

A Blended Learning Case Study 2020

About KFUPM

King Fahd University of Petroleum and Minerals is a public university in Dhahran, Saudi Arabia. Among Saudi universities, its science and engineering programs are highly regarded. It is ranked #186 in QS Global World Rankings 2021 and 4th in the Arab region . Discover more: <http://www.kfupm.edu.sa/>

About Department of Physics

The Physics Department strives to deliver high quality fundamental education in physics in accordance with international standards in order to prepare creative scientists with strong analytical, experimental, and communication skills. The physics faculty at KFUPM has a reputation for academic excellence and encourages student engagement through the effective use of digital technology.

Course: Multiple, cross-disciplinary – Key courses PHYS 101-201

Number of sections: 42 sections of course (not all using WileyPLUS)

Number of Students: 926 of which 461 students using WileyPLUS

Wiley Content: Halliday and Resnick's Fundamentals of Physics, 11th Edition

Goal

To assess the effectiveness of course-specific functionality and best practice sharing and to measure the correlation between the scores of students using WileyPLUS for Fall 2020 semester versus those students who are not.

Ideally, one would evaluate year on year performance but with the Covid-19 pandemic making the year so volatile, there were too many variables and the results would be unreliable. We have therefore looked at mid-term results and compared results on a section by section basis.

Approach

Dr. Ahmed Salem, Khan Alam, Dr. Khalil Harrabi, Dr. Nabil Maalej, Dr. Tariq Al-Abdullah and Dr. Wathiq Al-Bashir ran a three-quarter semester pilot with physics students and analysed the results to assess the added value based on engagement, grade changes and time saved through admin tasks (e.g. related to setting and reviewing student work, marking and time saved due to a reduction of face-to-face classroom style teaching etc.)

Evaluation

The pilot study has been a success with an overwhelming response from faculty to make a permanent move to using WileyPLUS.

KFUPM conducted a student survey which provides an important indicator of students' opinions and experiences of using WileyPLUS during the pilot.

Responses were gained from 123 students providing insight around WileyPLUS usability and overall effectiveness. The survey also helped to evaluate usage in relation to learning outcomes, the ability to work independently, understanding physics concepts as well as the impact of Covid-19 on the student digital learning experience.

Results

Evidence shows that there is a positive correlation between WileyPLUS and student performance in exams, adaptive practice and homework.

Exam results

Analysis of 461 students with light, medium and heavy engagement shows that students who performed better in exams also scored well at accessing and completing adaptive practice assignments. Data shows that students using WileyPLUS achieved higher grades, particularly in the heavily engaged sections.

Data (chart 1) shows the correlation graph between test scores and WileyPLUS scores. The correlation factor is +0.51.

Engagement Reports

Chart below (2) shows a positive correlation curve between the performance of 28 heavily engaged students (Section 34) in the mid-term exam versus their performance in WileyPLUS activities. The correlation factor is +0.76. The engagement reports enable faculty to monitor ongoing student engagement.

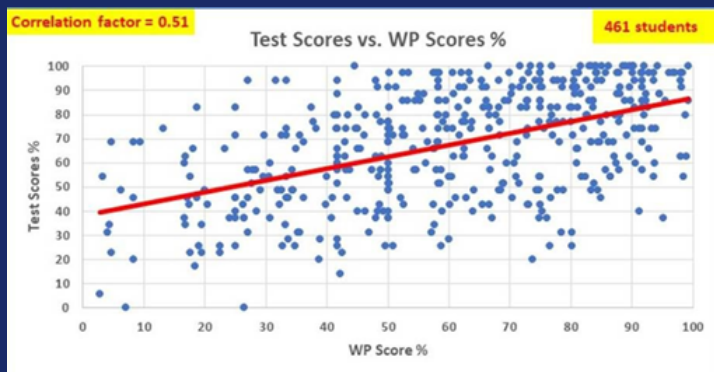


Chart 1

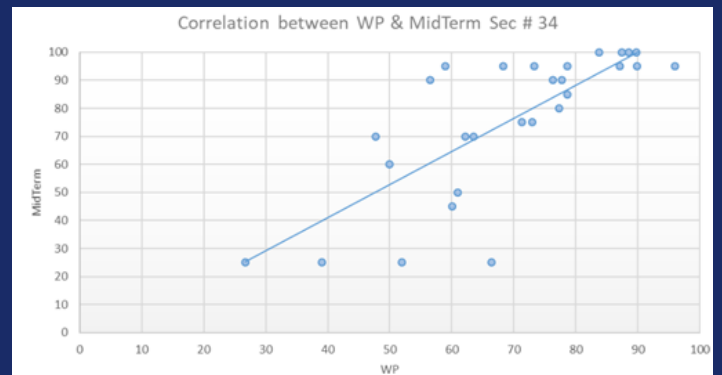


Chart 2

Correlation

Correlation coefficients are indicators of the strength of the relationship between two different variables. A correlation coefficient that is greater than zero indicates a positive relationship between two variables.

The chart (3) demonstrates that the correlation coefficient for section # 34 is 0.76. Statistically, this is considered to be a good to strong relationship. See this explanatory graph from a statistics reference.

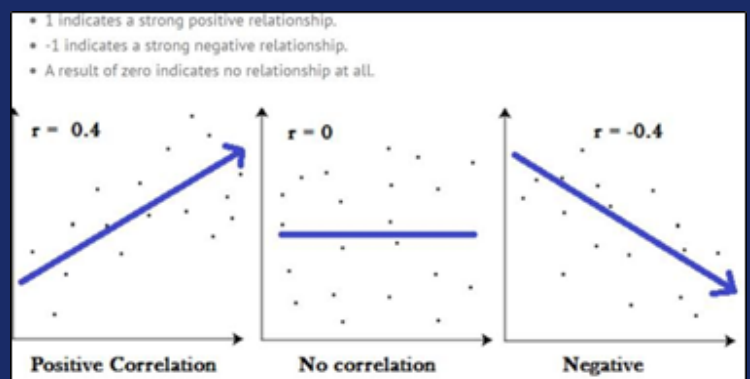


Chart 3

Adaptive Practice

In the survey, students were asked which WileyPLUS resources they found most helpful in understanding physics concepts. The responses in the chart (4) show a clear preference towards adaptive practice and assigned homework.

WileyPLUS resources considered most helpful in understanding physics concepts

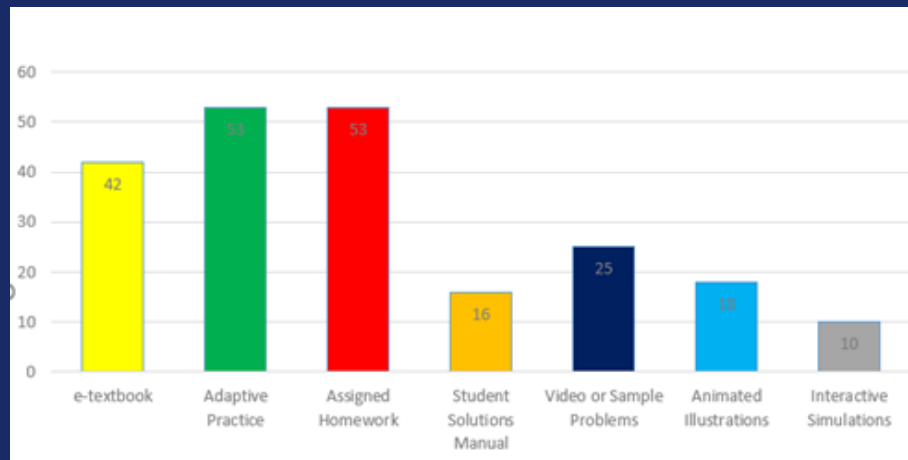


Chart 4

An additional survey was run to specifically explore the adaptive practice functionality when used on the 201Physics module. Faculty assigned a mix of activities within specific chapters in the form of a quiz or video and then assigned approx. 15-20 activities. There are a number of factors that contribute to the proficiency score such as correct answers, switching answers, time spent on question and confidence level. The chart (5) shows that 87% of students in one group of 31 students rated adaptive practice as being helpful.

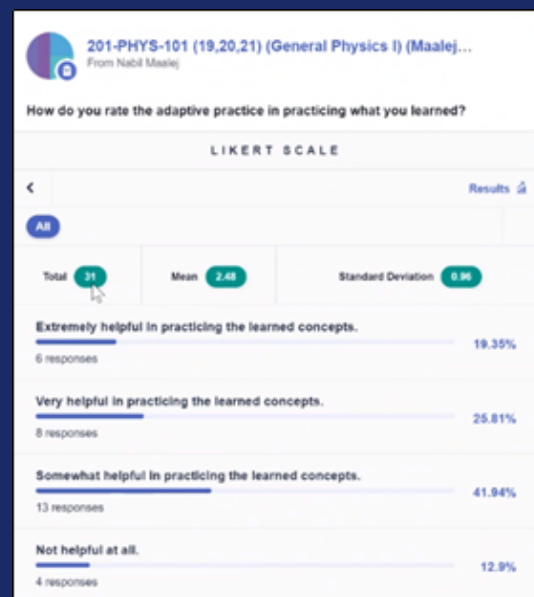


Chart 5

Feedback from the students around usage at KFUPM has influenced the shape of delivery and now faculty use more multiple choice style questions in the adaptive practice, an approach favoured by students.

"I found a very good agreement between student scores in adaptive practice and their exam grades." Dr. Nabil Maalej (Faculty)

Homework

Throughout the pilot study, faculty have been reviewing student participation in homework and submission rates before and after using WileyPLUS.

Participation

The chart (6) shows engagement of 29 students within an assignment by section and highlights the overall engagement of students. It shows an increased student participation rate.

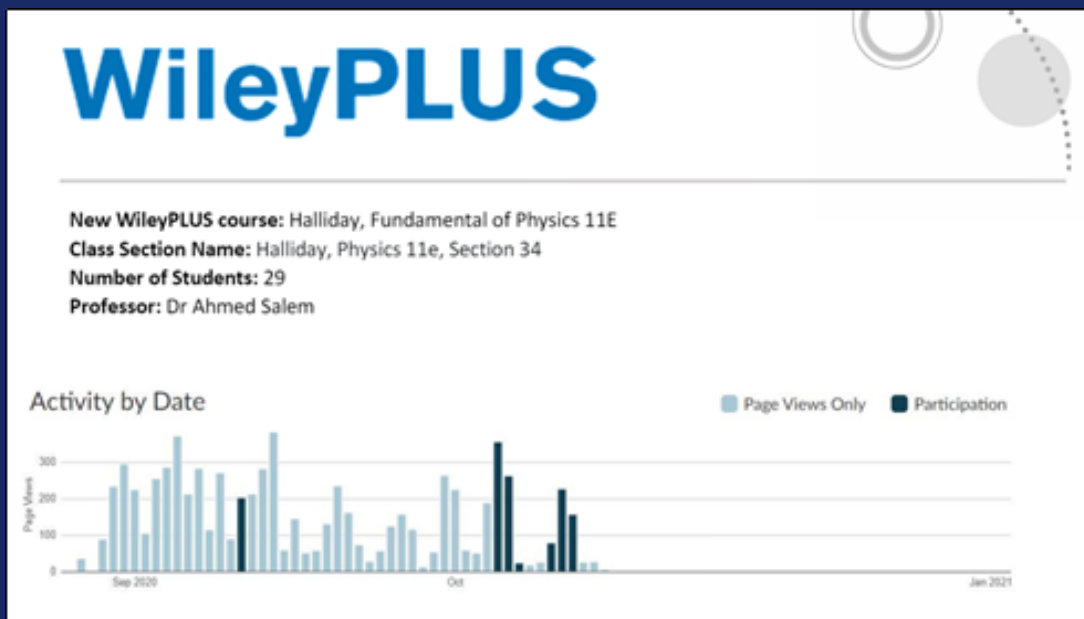


Chart 6

"I see WileyPLUS as a very beneficial source for building the foundation of concepts in each chapter, especially adaptive practice. It makes physics easier because after building the strong foundation I can solve KFUPM questions comfortably. I hope the university adopt WileyPLUS." – Student

"The adaptive practice is wonderful. So rich for student as a solid base material."

Dr. Tariq Al-Abdullah (Faculty)

Homework

Submission rate

The chart (7) shows a strong submission rate for assignments, a combination of homework and adaptive practice. It reveals that the majority of students submitted work on time. The missing work related to resources-based tasks.



Chart 7

Within this particular section, over 93% of homework tasks set, were delivered on time with no missing submissions (chart 8).

Assignment	Missing	Late	On Time
Ch 1: Adaptive Practice	0%	37%	13%
Ch 2: Adaptive Practice	0%	24%	68%
ch. 2 HW	0%	0%	93%
Ch 3: Adaptive Practice	0%	10%	86%
Ch. 3 HW	0%	0%	96%
Ch 4: Adaptive Practice	0%	3%	65%
HW Ch. 4	0%	0%	86%
Ch 5: Adaptive Practice	0%	17%	68%
HW Ch. 5	0%	0%	96%
Ch 5 Resources	65%	0%	34%
Ch 6: Adaptive Practice	0%	0%	79%
HW Ch. 6	0%	0%	93%
Ch 6 Resources	65%	0%	34%
Ch 7: Adaptive Practice	0%	0%	10%

Chart 8

Note: Faculty are also able to see usage in terms of total number of hours spent.

“Easy to handle, friendly software. It is well organized and easy to select problems. It posts the solution right after submission. You can follow the performance of each student in the adaptive practice. So rich for student as a solid base material ...

” Dr. Khalil Harrabi (Faculty)

Analysis of student usage of study materials during Covid-19 Pandemic

Today's students at KFUPM have a strong appetite for ready-to-go digital content and whilst usage in traditional textbooks still has a place, using an integrated digital solution saves time and is a better way to measure success.

The survey revealed that 41% of students believe that Covid-19 has had a positive impact on their digital learning experience and may influence learning behaviour going forward (chart 9).

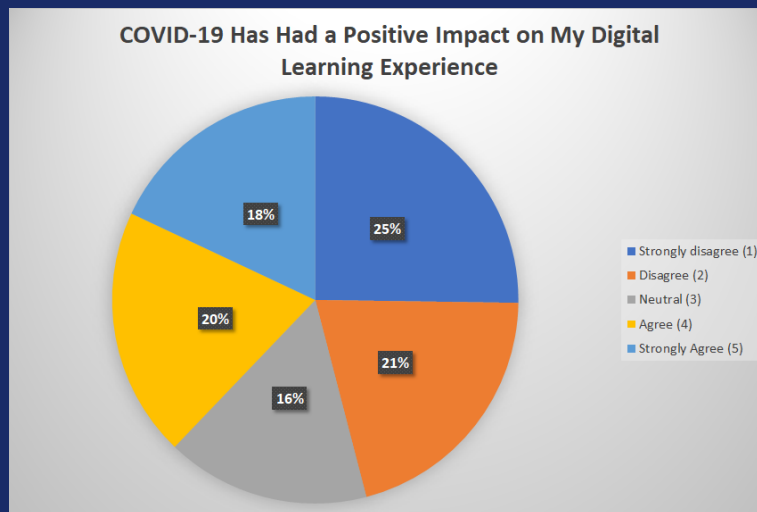


Chart 9

"I think the university should consider purchasing it for future physics courses, even when the classes are back to normal face-to-face classes." Student

"WileyPLUS is a marvelous tool..." Student

Benefits for Faculty

- Saves time for instructors – saves admin time and use of auto-grading.
- Easy to use and implement.
- The reporting and analysis shows better engagement.
- Faculty can clearly define the intent of an assignment and the ground rules which prevents students from being able to cheat or plagiarize.
- Technical support from Wiley Customer Success Managers – specifically around reporting and measuring student engagement and grades.

“Easy to use and is a very powerful tool to teach physics. I recommend getting WileyPLUS license for PHYS101 and PHYS102”

Dr. Wathiq Al-Bashir (Faculty)

Benefits for Students

- Improved student satisfaction.
- Improved engagement (especially around adaptive learning).
- Flexible 24/7 access to quality content.

*“WileyPLUS is a very powerful tool for learning, especially when I had conceptual problems ...
WileyPLUS is very helpful.”*

Student

Conclusion

This pilot study shows a positive correlation between WileyPLUS and student performance in adaptive practice and homework, with a strong submission rate for assignments. It also shows a positive correlation curve between the performance of some students in the mid-term exam versus their performance in WileyPLUS activities, particularly in the heavily engaged sections.

Key findings:

- 45% of students revealed that WileyPLUS helped to improve learning with more than half of those surveyed agreeing that WileyPLUS is very interactive, user friendly and easy to learn and navigate.
- 51% of students said that WileyPLUS enabled them to work independently and felt that it was too difficult to share answers between students.
- 59% of students suggested that adaptive practices are considered to be the most helpful resources in understanding physics concepts.

In conclusion, whilst not all faculty members are utilising WileyPLUS for their modules, on the results above, there is a strong indication that as more students transition to using a digital platform, it will have a positive impact on engagement, grades and overall student success across courses at KFUPM. Furthermore, Covid-19 has had a positive impact on the digital learning experience.

"In my opinion, WileyPLUS has many advantages. In particular:

- *Easy to manage*
- *It saves time: it takes few minutes to publish a HW*
- *Adaptive practice and the ability to track students' performance*
- *Variety of resources: e-Textbook, simulations, solved problems videos, animations ...*
- *Randomization of problems and numbers within the problem makes it a good tool (difficult for students to cheat)*
- *Availability of online technical support (live chat 24/7)*

*I *strongly recommend* using WileyPLUS" **Dr. Ahmed Salem (Faculty)***