# Bahrain Polytechnic Research Booklet 2019/2020

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## Research 2019-2020 activities at Bahrain Polytechnic

Bahrain Polytechnic was established to address the need for a skilled Bahraini labor force, aiming to support the Kingdom with economic growth and diversification. We deliver applied and technical qualifications to ensure our graduates are groomed to be workready, confident, and trained for a professional industrial environment.

As a learning organization, we are continuously updating our academic practices through engagement and conducting research with industries and stakeholders. Therefore, we are keen to be involved in applied research and innovation activities to provide the best human and technical solutions to industrial institutions and enterprises. our second research booklet, featuring a variety of faculty and student research activities for the year 2019-2020) Booklet.

We would like to thank our faculty members and students for their hard work and dedication towards their research efforts, as we strive to collaborate with organizations in the Kingdom of Bahrain and the region for more research and innovation activities in the coming future.

## **Research 2019-2020** activities at Bahrain Polytechnic

## **Faculty EDICT**

#### **EDICT Engineering**



Experimental Investigations of Dynamic performance of Polypropylene Ball Bearings Subramanian Chithambaram

#### Author:

Nesrine Gaaliche, Subramanian Chithambaram, Raouf Fathallah

#### Journal:

Journal of Theoretical and Applied Mechanics

#### Abstract

Thermoplastic bearings are finding its practical importance in light duty applications due to their good tribological property. Investigating the dynamic performance of thermoplastic bearing is crucial due to the heterogeneous material structure. In this work, effort has been made to investigate the dynamic performance of healthy and faulty polypropylene bearings. Condition monitoring of bearings is carried out using the developed test rig. The influence of the size of the defect, effect of frequency and load are investigated using vibration analysis. Radial accelerations and velocities were measured by accelerometers under different loads and frequencies. Test results reveal that FFT spectrum allows to localize the defect in the outer or the inner race and to the defect severity.

Effect of Defect size and load on the performance of the Thermoplastic Bearings

Author: Nesrine Gaaliche, Subramanian Chithambaram, Raouf Fathallah

Journal: Journal of Testing and Evaluation

#### Abstract

The dynamic performance of thermoplastic bearing with respect to defect size, location, applied load, and speed was investigated in this article. A fatigue test rig was developed in house to test the thermoplastic bearing. The vibration signals are measured continuously using a piezoelectric accelerometer to investigate the influence of the size and location of the defects of both polypropylene (PP) and polyoxymethylene (POM) bearings. Vibration signatures of metallic bearings are investigated and compared with thermoplastic bearings. Test results reveal that POM bearings exhibit less vibration amplitude compared to that of PP and metal. Peak vibration amplitudes of shaft harmonics and Fast Fourier Transform increase with respect to the load levels and are more pronounced in inner race defects

compared to outer race defects and are found to increase with the increase in defect size. A statistical indicator kurtosis shows the sensitivity to bearing damage by analyzing the vibration signals of the thermoplastic ball bearing. Thermoplastic bearing failure under high loads reveals wear and smearing as the important failure modes.

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## Diagnosis model for bearing faults in rotating machinery by using vibration signals and binary logistic regression

#### **Authors**

Ahmed M Abdelrhman, Lim Ying, YH Ali, Iftikhar Ahmad, Christina G Georgantopoulou, Fethma M Nor, Denni Kurniawan

#### Conference

**AIP Conference Proceedings** 

#### Abstract

As an important part of rotating machinery, bearing state affects the whole effectiveness and stability of machine components. Recently, many condition monitoring techniques have been developed for bearing fault detection and diagnosis to avoid malfunctioning during operation that might lead to catastrophic failures or even deaths. Vibration monitoring technique is the mostly used as it is costeffective to detect, locate and estimate bearing faults. Within the technique, the time domain features are favorable to be used for fault machinery faults detection and diagnosis. This is due to its advantages, including it contains all the machine faults information and possibility of using much data for easy and clear fault diagnosis. This study proposes a diagnosis model for bearing faults in rotating machinery based on time domain features

and binary logistic regression (BLR) modelling technique of a vibration signals. The steps of the new fault prediction method for bearings are as follows. First, vibration data were collected. Second, the effective time domain parameters extraction from the acquired vibration data sets using multivariate analysis of variance (MANOVA). Third, the data-splitting technique was employed. Here the predictive modelling was performed based on the BLR modelling technique by using the most salient time domain parameters of bearing fault state on the training data set and the selected BLR model was internally validated by using the testing data set. Finally, a comparison was made between the selected BLR model and an artificial neural network model with regards to their accuracy, computational efforts, and effectiveness. The results show the effectiveness and plausibility of the proposed method, which can support timely maintenance decisions in order to facilitate machine performance and fault prediction and to prevent catastrophic failures.

#### A Review in Particle Image Velocimetry Techniques (Developments and Applications)

#### Authors

Ahmed M. Abdelrhman, Salah Al-Obaidi M. Abdulwahab, Yasir H. Ali , Fatima J ,A. Borhana.

#### Journal

Journal of Advanced Research in Fluid Mechanics and Thermal Sciences

#### Abstract

The latest entrant into the fluid flow measurement field is the particle image velocimetry (PIV) which offers velocity field immediately in flow domains. Referring to the definition, the placement is recorded by PIV over time pertaining to small tracer particles that were released in the flow for local fluid velocity extraction. Thus, PIV can be regarded as a quantitative extension pertaining to visualization techniques for qualitative flow being practiced for a number of decades. This review provides a detailed background pertaining to evolution of PIV, principle of operation, basic elements, key features, uncertainty, errors in PIV as well as few applications of PIV. Recent advances pertaining to the PIV technique have been aimed at procuring all three components with regards to fluid velocity vectors simultaneously in a volume or in a plane that enables wider applications with the PIV technique for investigating more complex flow phenomena. In recent years, developing of various advanced PIV techniques have been successfully achieved, including threedimensional (3D) particle-tracking velocimetry (3D-PTV), tomographic PIV, holographic PIV (HPIV) technique and stereo PIV (SPIV). A comparison has been done between the main PIV techniques. (15) (PDF) A Review in Particle Image Velocimetry Techniques (Developments and Applications).

## Elevator Exhaustion Time Reduction by Eliminating Fake Demands

#### Authors

Qusay Hamad, Yasir Ali and Ahmed M. Abdelrhman

#### Journal

Pervasive Health: Pervasive Computing Technologies for Healthcare, 2020, 2, pp. 760–769 IMDC-SDSP 2020, June 28-30, Cyberspace

#### Abstract

Achieving the highest performance and efficiency of elevators have become an important area of research in the world of elevators. Because of the accelerating nature of the world, the interest in time and the rush to accomplish business became a major need for mankind. And that high buildings rely mainly on elevators, reducing the response time of the elevator is the most important research areas, so in this research, we propose an idea to provide the elevator to the person and not to false demand and this requires detection the presence of someone waiting for the elevator to the proposed system provides an algorithm based on the sensor PIR (passive infrared sensor). The results showed the size of profit achieved by the system and the profit is divided into profit times (reduce response time which leads to increase comfort for the rest of the people) and profit in reducing the energy consumed by the elevator.

## Early rotor blade fault detection in multi-stage rotor system based on wavelet analysis

#### Authors

Ahmed Abdelrhman, G Lee, M Leong, Najat Saam, Iftikhar Ahmad, Christina Georgantopoulou, Salah Ali.

#### Journal

Journal Review of Progress in Quantitative Nondestructive Evaluation

#### Abstract

Rotor blade fault is one of the most causes of turbine failures in turbomachinery. Vibration spectral analysis and blade pass frequency (BPF) monitoring are the most widely used methods for blade faults diagnosis. These methods, were however, have limitations in the detection of incipient faults due to weak and/or transient signals, as well as inability to diagnose the blade faults types. Wavelet analysis has been used as alternative technique to overcome these limitations. However, wavelet analysis itself have some limitations in analyzing signals contains small time alterations and closed frequency components due to lack in its time and frequency resolutions. Most of the studies were conducted in a single stage rotor system rather than multi-stage rotor as most of the gas turbines and compressors used in the industry. Therefore, the objective of this research work is to formulate an effective method for blade fault diagnosis in multi-stage rotor system. In this paper, a novel algorithm was formulated by combining the two newly developed wavelets (High Frequency Resolution (HFR) and High Time Resolution (HTR)). Through signal simulation and experimental studies, the proposed method showed to be effective in detecting types of early/minor blade faults which were otherwise not readily detectable using conventional wavelet and frequency spectrum analysis. The method also showed potential in segregating closely spaced BPFs components and identifying the faulty stage and fault location. The method demonstrated the ability in differentiating various blade faults based on a unique pattern ("fingerprint") of each fault produced by the newly added wavelet. The formulated algorithm was demonstrated to be suitable in monitoring rotor

## Numerical simulation in pipes with

systems with multiple blade stages.

## leakages

#### Authors

Christina Georgantopoulou, Ebrahim Khalifa, Nikolaos Vasilikos, Georgantopoulos G, Ahmed M. Abdelrhman and Iftikhar Ahmad

#### Conference

International Conference on Marine Engineering and Technology, Oman

#### Abstract

Petroleum and marine technology applications and infrastructures consist of extended pipelines' networks in order to accommodate fluid transfer needs. The pipelines' leaks may occur and lead to high energy and working fluid losses, while most of the times these are related to environmental hazards. Additionally, corrosion problems are reported due to this un-desirable flow rate loss. In this paper the rheological behavior of the crude oil flow inside pipes with one or two leakages is numerically analyzed, studied and solved. Un-uniform and adaptive grids to the location of the leakages are generated in order to cover the specific requirements of the pipe domain, while finite volume methodology is followed for the discretization of the flow equations. The type of the oil has been received to be the Arabian light one, while an approach is developed for its properties. The boundary conditions are the corresponded flow rate pressure flow conditions for all the exits of the pipe due to the better control of the algorithm that they usually provide. Various test cases have been developed for different Reynolds number values, providing robust and accurate results concerning the velocity and pressure distribution. It seems that high pressure variation is depicted near the location of the leaks, and in this way a clear indication is occur for such phenomenon.

#### Effect of part orientation on dimensional accuracy, part strength, and surface quality of three dimensional printed part

#### Authors

Ahmed M Abdelrhman, Wen Wei Gan, D Kurniawan Conference

IOP Conference Series: Materials Science and Engineering

#### Abstract

Additive manufacturing such as fused deposition modelling (FDM) three dimensional printing machine can deliver complex shapes with fine details in relatively short building time using various materials (albeit mostly polymers in this case). However, the quality of the printed results might vary depending on the set input. The present study aims to investigate the effects of part orientation on dimensional accuracy, part strength, total cost, and surface quality of a three dimensional printed part. Five test specimens were printed on FDM machine with polylactic acid (PLA) as the material by varying the build orientation, i.e. X0°Y0°, X90°Y0°, X0°Y90°, X0°Y45°, and X90°Y45°. Dimensional accuracy, surface roughness, and part strength were measured by using digital vernier calliper, universal testing machine, and portable surface roughness tester, respectively. The results show that part orientation influences printed part quality. especially in accuracy and surface roughness. No part orientation studied delivered all positive quality expected, but overall, X0°Y0° orientation resulted the highest quality in terms of dimensional accuracy, mechanical properties, and cost.

Observations of changes in acoustic emission parameters for varying corrosion defect in reciprocating compressor valves

#### Authors

Salah M Ali, KH Hui, LM Hee, M Salman Leong, Ahmed M Abdelrhman, Mahdi A Al-Obaidi Journal: Ain Shams Engineering Journal

#### Journal

Ain Shams Engineering Journal

#### Abstract

Acoustic Emission (AE) technology is probably one of the most recent entries in the field of machinery condition monitoring. This paper investigates the application of AE parameters for valve faults detection in reciprocating compressor. The defective valves were designed by emulating the actual valve corrosion with varying sizes such that defects could be applied onto the reciprocating compressor. A set of experiments was performed to acquire the AE signal. The primary source of AE signal was verified using waveform analysis. The AE parameters versus different operational and valve condition were illustrated individually. In addition, the significance of the change and sensitivity of AE parameters versus different experimental conditions was verified using MANOVA and coefficient of variance analysis. It is concluded that the AE signal parameters can be used to detect the valve faults in the reciprocating compressor with the consideration of the variation in the AE parameters sensitivity.

#### Adapted Wavelet Transform for Twisted Blade Diagnosis in Multi Stage Rotor

#### Authors

Ahmed M Abdelrhman, M Salman Leong, YH Ali, Iftikhar Ahmad, Christina G Georgantopoulou, Salah M Ali.

#### Conference

MATEC Web of Conferences

#### Abstract

This paper studies the diagnosis of twisted blade in a multi stages rotor system using adapted wavelet transform and casing vibration. The common detection method (FFT) is effective only if sever blade faults occurred while the minor faults usually remain undetected. Wavelet analysis as alternative technique is still unable to fulfill the fault detection and diagnosis accurately due to its inadequate time-frequency resolution. In this paper, wavelet is adapted and its timefrequency is improved. Experimental study was undertaken to simulate multi stages rotor system. Results showed that the adapted wavelet analysis is effective in twisted blade diagnosis compared to the conventional one.

#### Automated Valve Fault Detection Based on Acoustic Emission Parameters and Artificial Neural Network

#### Authors

M Ali Al-Obaidi Salah, KH Hui, LM Hee, M Salman Leong, Ali Abdul-Hussain Mahdi, Ahmed M Abdelrhman, YH Ali

#### Conference

MATEC Web of Conferences

#### Abstract

Reciprocating compressor is one of the most popular classes of machines use with wide applications in the industry. However, valve failures in this machine often results unplanned shutdown. Therefore, the effective valve fault detection technique is very necessary to ensure safe operation and to reduce the unplanned shutdown. This paper proposes an artificial intelligence (AI) model to detect valve condition in reciprocating compressor based on acoustic emission (AE) parameters measurement and artificial neural network (ANN). A set of experiments were conducted on an industrial reciprocating air compressor with several operational conditions including good valve and faulty valve to acquire AE signal. A fault detection model was then developed from the combination of healthy-faulty data using ANN tool box available in MATLAB. The results of the model validation demonstrated accuracy of valves condition classification exceeding 97%. Eventually, the authors intend to do more efforts for programming this model in smart portable device which can be one of the innovative engineering technologies in the field of machinery condition monitoring in the near future.



#### **Iftikhar Ahmed**

Design and development of a lightweight SLS 3D printer with a controlled heating mechanism: Part A. International Journal of Lightweight Materials and Manufacture

#### Authors

G. Hussain, Wasim A. Khan, H. Anas Ashraf, H.Ahmad, Hamza Ahmed, Ali Imran, I. Ahmad, K.Rehman, G. Abbas

#### Journal

International Journal of Lightweight Materials and Manufacture https://doi.org/10.1016/j.ijlmm.2019.01.005

#### Abstract

Selective laser sintering (SLS) is one of the hot topics in the manufacturing research community. The SLS printers developed by the researchers have shown a great potential, however, it needs a lot of improvements to be considered for commercial usage. Here, we report an improved design of the SLS printer with a unique heating mechanism to ensure enhanced mechanical properties of the final part. These improvements came in the form of enhanced heating mechanism for the printer once the reverse engineering concepts were

put together to come up with an innovative yet a hybrid mechanism for the enhanced output scalable design. The design included two axes voltage. Two piezoelectric beams with wound movement of the laser via computer numerical coils have been fixed in 3D printed spacers control (CNC) router as opposed to traditional to yields a prototype having the total volume complex controlled reflecting mirrors. Complete of 10.8 cm3. The prototype can generate a models were developed regarding the laser maximum open circuit voltage of 1640 mV at a power, motor torque and determining the very low vibration level of 1.5 g which proves specific layer height for layer by layer sintering that the device is suitable for low vibration based on the nylon powder as the raw material. environment such as human body vibration. Static structural analysis was carried out on the printer to identify the material to be used for required strength. Complete electrical control of the printer was developed using Raspberry Pi which was coded via python to control the motors of each axis in the printer. Successful testing of the electronic and control system of the proposed SLS printer is also illustrated in this work.

#### Wearable vibration based hybrid energy harvester for wearable devices

#### Authors

Iftikhar Ahmad, Ahmed Abdelrhman, Christina Georgantopoulou, Syed Asad Imam, Saam Najat

#### Conference

International Conference on Modeling Simulation and Applied Optimization (ICMSAO)

#### Abstract

Wearable devices are used in human health monitoring and their demand is increasing day by day. The limited shelf life of the batteries in these devices is one of the main problems. Research is going on either to increase the battery life or to replace the battery with some alternatives. In this research, a vibration based hybrid energy harvester has been illustrated to overcome the power problem of the wearable devices. The piezoelectric and electromagnetic transduction mechanisms are used to develop





#### Margie Borshke's This is Not a Remix, **Review by Owen Gallagher**

Authors **Owen Gallagher** 

#### Journal

Media Theory, Open Access Peer-Reviewed Journal (2019)

#### Abstract

This is Not a Remix is a densely-packed academic monograph based on Margie Borschke's research into the changing meaning of remix in the context of music culture. Borschke offers perspectives on questions regarding the nature of remix and the role of copies in how we understand media. I read This is Not a Remix twice for this review, first as an ebook on an iPad, swiping right to reveal more of Borschke's thesis, and then as a paperback—an altogether more tactile experience, due to the smell of fresh ink on paper, the physical act of turning the pages and the eye-catching cover. The content of both versions was exactly the same, yet the experience of reading each book was fundamentally different. Following Borschke's argument, each is a copy but also a different instance of the source material. In this case, the form of the content is also different, even though the arrangement of words, sentences, paragraphs and chapters is precisely the same.

#### **Rethinking Intellectual Property: The Right to Remix**

Authors Dr. Owen Gallagher

#### **Research Workshop** MASHED: Mashup Music, Copyright, and Platform Regulation (2019)

#### Abstract

This paper focuses on the formal properties of remix, in terms of medium specificity, with a particular focus on sampling, and subsequently presents a breakdown of my proposal for an alternative economic system that could potentially balance the right to remix with the rights of artists and authors to profit from their work in networked digital environments. The context of this workshop involved examining underlying principles and values within the mashup scene in order to delineate the specificity as well as the historical and cultural rootedness of mashups, and to theorize relevant concepts such as creativity, originality, authorship, and ownership from both a theoretical and empirical point of view.

#### Forking Paths in New Media Art **Practices: Investigating Remix**

#### Authors

Dr. Owen Gallagher (with Eduardo Navas and xtine burrough)

#### Journal

Media-N Open Access Peer-Reviewed Journal of the New Media Caucus (2021)

#### Abstract

This special issue of Media-N on contemporary approaches to remix was inspired by Jorge Luis Borges's short story, "The Garden of

Forking Paths," a recurring point of reference in the development of media culture. 1 Prior to terms such as new media, digital art, media art, and remix, Borges's narrative exploration of bifurcation as a means of reflecting on the possibility of multiple simultaneous realities with no clear beginning or end has offered a literary and philosophical model for creative uses of emerging technology throughout the twentieth century. The essays included in this special issue provide a glimpse into the relation of Borgesian multiplicity and remix as an interdisciplinary methodology.

#### Remediation

#### Authors

Dr. Owen Gallagher

#### Journal

The Routledge Encyclopedia of Citizen Media (Routledge, 2020)

This paper is concerned with the motion of an idealized rocket sent from Earth to the Moon. A rocket differs from a projectile in that a rocket is Abstract subjected to a thrust for part of its journey. The This entry considers the role of remediation in rocket under consideration is unmanned. In the citizen media, focusing on a number of relevant vicinity of Earth, the forces acting on the rocket, examples and case studies from the past in decreasing order of magnitude, are the thrust, decade where newer forms of remix have been air drag, and gravity. A method has been devised used to engage in political discourse or support to estimate the probability that the rocket hits social action. For example, critical remix the Moon. A simplified model of the system was video has emerged as an extremely potent composed in order to reduce the complexity of form of citizen media production through its the calculations. Some parts of the model have remediation of existing source material in order errors associated with them. For each of these to critically engage with ideological biases and parameters an error profile has been decided highlight perceived wrongs. The Cambridge upon. The estimation method involves making Dictionary offers an alternative definition of calculations based on this model. For clarity, a remediation as "the process of improving or worked example is shown. correcting a situation", which, as this entry shows, is precisely what citizen-engaged remix aims to do.





#### Will an Idealised Rocket Hit the Moon?"

**Authors** Alan Oxley

#### Journal

Refereed journal paper

#### Abstract

#### Journal

Refereed journal paper

#### Abstract

## The Mathematics of Getting to the Moon

#### Authors

Alan Oxley

#### **Conference** paper

The mathematics of getting to the moon

#### Abstract

An example problem is given. It concerns estimating the time taken for a simplified rocket to hit the moon. The PBL approach described is suited to several categories of student: those studying Ordinary Differential Equations (ODEs); those who have already been taught ODEs and need to know how to solve them on the computer; those who already know about ODEs and wish to study the topic of uncertainty, i.e. the probability that the rocket hits the moon. The research question is "How do the students experience their learning of ODEs in the PBL process?" This paper looks at features of a problem that are supportive of its use in problem-based learning (PBL). As the problem domain under consideration is STEM, some of these features are general ones and apply to any discipline whilst others are specific to STEM disciplines. There are too many features to list in the abstract. The suitability of this example problem for PBL is explained by showing how the example problem satisfies all the features referred to above for a PBL problem. The author has tackled the 'rocket to the moon' problem to the extent that a competent final year undergraduate might tackle it for the submission of a thesis. There are different stages of the rocket's flight. The equation(s) of motion for the rocket at the different stage(s) under consideration must be derived. This is made easier by having an idealized rocket and a simplified model of the Earth, its atmosphere, the Moon and how the Moon orbits the Earth. The Earth's

atmosphere is a complex phenomenon, and this is modelled as layers. The layers closest to the Earth offer less resistance to the rocket's motion than those layers further away from the Earth. Students could work individually or in groups. The process of finding a solution is as important as finding the right solution. The problems involve students in writing computer programs. The languages that are best suited are those that have built-in routines for solving ODEs. The overall problem was solved by the author using Octave, which is freely available software very similar to MATLAB. In the classroom, a tutor would need to support students in debugging programs. The students (and other tutors) should find this PBL approach an acceptable means of learning. Having tackled the 'rocket to the moon' problem, the author can recommend it as highly suited to a candidate problem for PBL.



## Using Epistemic Game development to tech software development skills

#### Authors

Christos Gatzoulis, Andreas Andreou, Panagiotis Zaharias, Yiorgos Chrysanthou

#### Journal

International journal of game based learning -Publisher IGI global

#### Abstract

This paper presents a pilot study on the evaluation of instruments for data gathering for an epistemic game development competition for high school students. The initial results show that a significant percentage of the students who participated in the competition appear to exhibit a skillset of professional attitude, software-related knowledge, and employability traits, and this skillset may be attributed to the intervention. The data was validated through a two-method triangulation technique that utilized expert evaluation and participant interviews. The data analysis shows early indicators of the desired learning outcomes, although a more thorough methodology is needed to verify this. Furthermore, the competition acts as an awareness campaign that promotes computer science studies through a gamification process. It is proposed that competitions of this type are held and evaluated on an annual basis to



maximize the benefits and to further prepare students to acquire early in their studies a skillset that will make them the innovators of the future society.

## 2- Academic Development – Curriculum Development

## **3- School of Foundation**



Addressing the Demands of 21<sup>st</sup> Century Thinking through the Bahrain Polytechnic Learning and Teaching Model

Authors Rogelio JR Levardo

#### Conference

Presented at the 2019 BTI Training Summit (26-27 March 2019) conference proceedings from the 2019 Ministry of Education / Bahrain Training Institute Training Summit https://www.moe.gov.bh/pdf/training-summitbooklet.pdf

#### Abstract

Bahrain Polytechnic prides itself as a pioneer in the use of student-centred, active learning methodologies, particularly problem- and project-based learning (PPjBL). This presentation aims to share what the PPjBL model is and how it was developed. The presentation likewise aims to share the successes, challenges and future plan iterations of the PPjBL model.

#### Enhancing Remote Class Facilitation through Real Time Virtual Observations

Authors Rogelio JR Levardo

#### Conference

Presented at the "Innovative Academic Practice in the Time of COVID 19" conference of University of Bahrain (22- 23 June 2020)

#### Abstract

As COVID 19 has descended worldwide, education is a sector that has been hard-hit. As emergency responses were put in place to ensure the continued learning of students, Bahrain Polytechnic shifted almost immediately to virtual delivery of all its programmes. As Bahrain Polytechnic values the provision of feedback to its academics, even the class observation process was taken online. Aside from the pedagogical perspectives, the academic's proficiency in using the virtual platform, student response to the experience and best practices were included. This presentation focuses on showcasing successful practice in relation teaching, learning and formative assessment done in a virtual environment as evidenced by a formal online class observation.



#### Problem-based learning and the development of key skills in Foundation Mathematics

#### Authors

George Toworfe , Maitham AlMuharaqqi, George K. Toworfe (2020)

#### Journal

Journal of Teaching and Teacher Education, 8(2), 97-103. http://dx.doi.org/10.12785/jtte/080204

#### Abstract

This study investigates and evaluates the impact of PBL, as an instructional strategy, in the education and the effective T&L of Mathematics on Foundation students' skills at the Bahrain Polytechnic.

Kahooting: Exploring the impacts of Game-based learning on Bahrain Polytechnic Foundation students in Information technology (IT) Courses

#### Authors

Fatima W, Hana A, Toworfe, G. (2019)

#### Journal

Journal of Teaching and Teacher Education, 8(1), 29-38. http://dx.doi.org/10.12785/jtte/080104

## Incorporating Opioids into Micro - to Nano - Structurally Optimized Silica Xerogel Controlled Release Delivery

Systems Prevents Abuse. (2019)

#### Abstract

The study explored the impact of Kahoot as a gamification or online game-based tool on learners' achievement and proficiency levels. Students' academic achievement levels were investigated to identify the effectiveness of online game-based platforms in teaching Information Technology courses.

Incorporating Opioids into Micro - to Nano -Structurally Optimized Silica Xerogel Controlled Release Delivery Systems Prevents Abuse. (2019)

#### Authors

George Toworfe

#### Journal

European Scientific Journal.15 (24), 1 - 12. ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431. https://doi.org/10.19044/esj.2019.v15n24p1

#### Abstract:

This study proposes that by incorporating the medicine into a micro- to nano-structurally optimized delivery material, release concentrations that cannot exceed therapeutic target levels will be achieved and therefore, curbing its misuse, even when the carrier material is crushed.

#### Students' Attitude Towards Undergraduate Foundation Mathematics Remediation in A HE Institution in Gulf Country (2019)

#### Authors

Santhanam, N, Shrivastava, R and Toworfe, G

#### Journal

International Journal of Research in Education Methodology Vol 10 (2019) 3358 – 3367. ISSN: 2278-7690. DOI: https://doi.org/10.24297/ ijrem.v10i0.7761

#### Abstract

This study outline causes why Foundation Mathematics students are reluctant to access support and remedial structures that are put in place to enable them to achieve their academic goals.



Impact of Integrating IT in Mathematics Teaching Strategies on Undergraduate Foundation Students at the Bahrain Polytechnic (2019)

Authors AlMuharraqi, M and Toworfe, G.

#### Journal

Journal of Teaching and Teacher Education, 7(2), 33-45. http://dx.doi.org/10.12785/ jtte/070201

#### Abstract

This paper reports on a study conducted on learners and faculty to investigate whether IT-integrated strategies utilized by faculty has impacted students' academic experiences and goals. Data collected in this study contrasted the influence of technology-driven lessons on students' performance before and after integrating IT into teaching and learning strategies with focus specifically on Foundation Mathematics students at the Bahrain Polytechnic by comparing data from pre and post IT-integrated teaching.

#### Impact of Integrating IT in Mathematics Teaching Strategies on Undergraduate Foundation Students at the Bahrain Polytechnic

Authors Maitham Al Muharruqi

#### Journal

J. Tea. Tea. Edu. 7 (2), 33 – 45. (July-2019). ISSN (2210-1578) DOI: http://dx.doi. org/10.12785/jtte/070201

#### Abstract

The current trend in tertiary education is to integrate IT into teaching and learning strategies to enhance the students' learning experiences. Faculty is therefore encouraged to make use of available IT infrastructure and applications as a platform to provide online access to the study materials as well as additional online module activities aimed at enhancing student learning. This paper reports on a study conducted on learners and faculty to investigate whether IT-integrated strategies utilized by faculty has impacted students' academic experiences and goals. Data collected in this study contrasted the influence of technology-driven lessons on students' performance before and after integrating IT into teaching and learning strategies. The study focused specifically on Foundation Mathematics students at the Bahrain Polytechnic by comparing data from pre and post IT-integrated teaching. Quantitative data collected, was analysed, statistically, using t-Test and Regression analysis. The results indicated that the students' overall grades in the Mathematics courses were affected. especially in their performance in interpreting results and that students tend to be more focused on understanding the implications of solutions to mathematical problems and expanding their knowledge beyond the subject



boundaries, in contrast to focusing on only solving mathematical problems. Furthermore, the qualitative data collected via students/ tutors focus group discussions strongly supports the data obtained from the statistical analysis and emphasizes on the positive effect of how integrating technology in teaching and learning enhances students' learning experiences.

#### Problem-Based Learning and the Development of Key Skills in Foundation Mathematic

#### Authors

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#### Journal

Journal of Teaching and Teacher Education

#### Abstract

Problem-based learning (PBL) is a studentcentered teaching and learning (T&L) approach capable of stimulating students' mathematics and related skills. The T&L of Mathematics has always been routine and lacked the capability to develop certain skills in learners. As a result, students learning Mathematics are unreceptive and unable to reason mathematically. No available data has yet reported on the impact of PBL in enhancing students' mathematical, problem solving, communication and teamwork skills, in any HE institution in the Arabian Gulf region. This study, therefore investigates and evaluates the impact of PBL in the effective T&L of Mathematics on Foundation students' skills at the Bahrain Polytechnic. The PBL instructional strategy adopted by the Polytechnic in 2013 has been systematically implemented across the curriculum in the various faculties. Its impact, although visible however, has not yet been empirically evaluated. Both gualitative and guantitative

data on Foundation Mathematics students was obtained for the study; which included tutors' feedback from focused group meetings, data from questionnaire administered to students and a comparative data on traditional teaching strategy versus PBL-based instruction. Data was subjected to Descriptive statistical analysis and Wilcoxon's test, to ascertain the development of students' mathematical abilities and skills after implementing PBL teaching strategies in the Foundation Mathematics courses. Findings indicated that PBL impacted positively on students' mathematics related skills. Students demonstrated enhanced effective problem-solving skills, better mathematical communication skills, independent learning and stronger teamwork.





### Students' projects

## School of Information and Communication Technology

Project Title: An Exploratory Pilot Study on Human Emotions during Horror Game Playing



Authors Anas Ali, Christos Gatzoulis

#### Conference

Accepted at Proceedings of 2020 International Conference on Innovation and Intelligence for Informatics, Computing and Technologies (3ICT) – IEEE Bahrain– IET UK

#### Abstract

Enhancements in technology have allowed games to expand the variety of ways for new and better experiences. These experiences are often expressed by the players through their emotions either internally, externally, or in both manners. Nevertheless, it is crucial for developers to make sure that the players are not overwhelmed with emotions eventually ruining the experiences. With the introduction of immersive modalities, games can read the emotions of the players, allowing the developers ensure that the game does not overwhelm the players in any way. This is done by having the game adapt to the readings of the player's emotions, allowing the players to

cope and regulate their emotions frequently. The technologies can also allow players suffering from emotional illnesses to regulate their emotions and support studying methods of regaining control over their emotions. In this project, an immersive modality for emotional valence recognition is integrated into a horror game that includes the feature of adapting to the emotions of the players. It also aims to determine how well the readings from the modality are, by comparing them with the selfevaluation report of participants. The chosen modality for emotion recognition is facial emotion readings through a camera. To test the consistency and accuracy of the modality with the personal experiences of the players, the results from a self-evaluated questionnaire containing personal experiences answers are compared with the readings from the modality using the Pearson's Correlation Coefficient formula indicating their correlation strength. Moreover, the research explores the temporal effect of induced emotional states in situations where the game play experience varies. The results show a moderately reliable consistency result of the facial emotion recognition modality and the self-evaluated emotional states. Finally, while initial results indicate that induced emotions may have a temporal effect, more data is needed to validate this observation.

#### Project Title: Reinforcement Learning for Physics-Based Competitive Games



Authors Abdulla Albuainain, Christos Gatzoulis

#### Conference

Proceedings of 2020 International Conference on Innovation and Intelligence for Informatics, Computing and Technologies (3ICT) – IEEE Bahrain – IET UK

#### Abstract

Physics-based games are vast in terms of possible state spaces. There are many strategies that can be implemented in competitive games such as playing passively and waiting for the opponent to make a mistake, playing aggressively to force mistakes from the opponent, or even using environmental objects to an agent's advantage. The vastness of possibilities makes it difficult for a programmer to account for all these situations and create a rule-based intelligent and believable hard-coded AI agent. This project seeks to take advantage of reinforcement learning to create agents that can adapt to dynamically changing physicsbased environments such as the example of competitive vehicular soccer games. It seeks to produce believable agents that perform intrinsic behaviors such as defending their goal and attacking the ball using reward functions. Through trial-and-error, the reward function is modified to progressively form behavioral patterns that improve in performance. The performance tests prove that a reward function that considers different state space parameters can produce better performing agents compared to ones with a less defined reward function and state space. Moreover, the final agent trained through the experiments has proved to be believable and hard to distinguish from a human player.

