Innovative Work Behavior among Teachers in Malaysia: The Effects of Teamwork, Principal Support, and Humor

Aduni Binti Johari[1], Nor Wahiza Abdul Wahat[2*], Zeinab Zaremohzzabieh[3]

[123]Faculty of Educational Studies, Universiti Putra Malaysia,
43400 Serdang Selangor, Selangor, Malaysia
adunijohari@gmail.com
wahiza@upm.edu.my
z_zeinab@upm.edu.my
*Corresponding Author

Abstract: The Fourth Industrial Revolution (Industry 4.0) gives impetus to educational reform. Education experts have recently recognised the benefits of using technology in learning and teaching. They believe that innovations will shape Education 4.0 and that teachers will need to be prepared to build creative learning environments that support student creativity. Thus, the main purpose of this paper is to examine the relationships between teamwork, principal support, humor, and innovative work behaviour (IWB) among teachers. This study was conducted using a questionnaire, with a sample size of 354 school teachers in Malaysia. Multiple linear regression analysis has shown that teachers with high quality of teamwork and principal support were more likely to report innovative work behaviour. The findings indicated that teachers who frequently use humour can create more innovative behaviour. This paper can help managers and policymakers in the education sector, to develop a better understanding of these aspects, and their influence on teachers' innovative behaviour at work. In doing so, it would be helpful if teachers learnt effective procedures for innovative behaviour in class, via means of teamwork, humor, and principal support, to enhance their educational efforts. It is, therefore useful to establish university courses for pre-service teachers, focusing on new collaborative innovation strategies to encourage creativity and innovation in educational settings, and to apply collaborative creativity exercises in the classroom.

Keywords: Teamwork quality, Humor, Principal support, Teachers, Innovative work behavior, Malaysia

1.   Introduction

Teachers' spectrum of behaviors shapes the classroom and institutional culture of schools. The dawn of Education 4.0 has called upon institutional obligations to transform conventional classrooms into digital classrooms, which must achieve learning objectives that focus on innovation and leadership (Göker & Göker, 2020). Industry 4.0, previously known as the Fourth Industrial Revolution, has brought forth a huge social shift, which provides an impetus for educational transformation (Lee et al., 2014). According to Harkins (2008), Education 1.0 responded to the needs of the agrarian era, Education 2.0 came about from the first industrialization boom, Education 3.0 emerged from a globalized world, and now Education 4.0 is shaped by the era of burgeoning innovations. Therefore, teachers and schools are expected to train, shape, and produce students who will join a future workforce of innovative creators and implementors (Carvalho & Goodyear, 2018).

Therefore, it is important to investigate what determines the success of a school in terms of nurturing innovative work behavior (IWB) among teachers. The importance of IWB among teachers

includes responding to rapidly evolving societies, being a role model, and meeting the IWB requirements of an Education 4.0 ecosystem at the institutional level (Puncreobutr, 2016). At the individual level, Abd Ghani et al. (2009) defined IWB as "the creation, introduction, and application of new ideas" in the organization, with a focus on organizational performance outcomes. It is also supported by the work of Zuraik and Kelly (2019), which advocated that IWB's ultimate goal was to benefit individuals or boost organizational performance from employees' intentional creation, introduction, and application of fresh ideas in their working roles. Thus, teachers who display IWB are creative educators, who contribute ideas which boost school performance.

The recent educational challenges in developing countries have involved embedding innovation in all aspects of academia. In Malaysia, the government rolled out the Malaysia Education Blueprint (2013 – 2025), to ensure that innovation gets integrated into teaching and learning practices, as a strategic move to provide quality, relevance, and competent individuals and employees (Ministry of Education, 2013). In line with this, the Malaysian school standard curriculum has been revised and fine-tuned into a holistic package, that encompasses the elements of balance, creativity, critical thinking, and innovation, in the fields of science, technology, and communications (e.g., Ahrari et al., 2016). Schools and teachers should not neglect the standards of a student's physical and mental development, which includes their attitude, values, self-esteem, humanity, and spirituality. The new curriculum also emphasizes the use of innovation in content creation and delivery, which directly affects the quality of teaching and learning (Enzai et al., 2021).

In Education 4.0 environments, the convergence of talents and creativity often takes place. Teachers, as innovation stewards, are expected to upskill, take on new tasks, take ownership of activities that foster creative growth, and be part of the change processes which shape the new school culture. The challenges are real and overwhelming, which is why most teachers shun innovation at work. Izzati (2018) reported that Malaysian school teachers are stuck in their comfort zone, preferring to use only conventional and familiar learning strategies, and fall back on blanket solutions. Thus, the heterogeneity of students is not acknowledged, whereby different methods and approaches are much more suited. On this basis, scholars Hulse and Owens (2019) argued that teamwork, humor, and principal support are possible ingredients to nurture a facilitative environment that encourages teachers to develop IWB.

The underlying workings of IWB are social. Therefore, teamwork holds the potential to significantly extend IWB engagements. Schippers et al. (2015) studied teams that consisted of members who displayed team learning behaviors. They observed that these teams developed robust IWB engagements, which fostered innovations to solve complex problems in their organizations. This underscored the importance of not discounting conditions that influenced learning behaviors in a team so that organizations can benefit from IWB. Furthermore, evidence suggests that the humor used by school teachers can create and sustain the positivity of both working and learning environments. Humour allows the playful combination of ideas that seem mutually exclusive at the initial stage (Samson & Gross, 2012). Seeing the funny side of situations also creates an atmosphere that encourages open discussions and out-of-the-box ideas. In a study on idea generation, it was found that when amusing comments were exchanged during team meetings, the momentum of the idea generation process was sustained, even if the humorously presented ideas had no connection to the actual solution (Sinkeviciute, 2019).

Researchers argued that principal support plays an important role in supporting the IWB (Chen et al., 2011). Teachers identified principal support as critical to the success of their teaching practice (Liebowitz & Porter, 2019). When teachers felt supported by their school managers, they reciprocated by serving above and beyond, to uplift the school's standards and reputation, as well as encourage the students' innovativeness.

Paradoxically, however, little has been done to investigate to what extent teachers are engaged in IWB, for the implementation of teaching and learning practices. A previous study investigated the role of network size as a facilitator of IWB outside the classroom (Gerhard Messmann et al., 2018). Another study indicated that team learning behaviours, especially team reflectivity and boundary, relate positively to IWB among vocational educators (Widmann & Mulder, 2018). Further research established and validated a multidimensional Innovative Work Behavior Instrument for IWB Teacher Measurement (Lambriex-Schmitz et al., 2020). Lambriex-Schmitz et al. (2020) also found that

management support and exposure to innovations served as a predictor for teachers' IWB. A previous study focusing on Malaysia identified the level of IWB among secondary school teachers in Malaysia and the impact of transformational leadership on IWB teachers before and after the inclusion of teaching commitment as a mediator (Aziz et al. 2020; Ismail & Mydin, 2019).

In addition to the above-mentioned studies, no researcher has yet to rigorously examine the effects of teamwork and humor on IWB among Malaysian teachers. Studies on the influence of principal support in strengthening IWB are also even more limited in the education field. Many scholars highlighted that IWB studies in academia have yet to receive the level of attention it deserves (Baharuddin et al., 2019). Despite growing evidence of academia-situated IWB, some gaps need to be addressed. There are dynamic variables associated with IWB, namely teamwork, humor, and principal support. An understanding of their relationships is new knowledge, which is much needed to shed light on how teamwork, humor, and principal support enhance the IWB processes in the Malaysian education context. Therefore, this study seeks to examine the relationships between the said variables, and the IWB among Malaysian school teachers.

2. Literature Review and Hypotheses Testing

2.1 Innovative Work Behaviour (IWB) of Teachers

School managers consider IWB as a key driver in raising the quality of education. The general idea is that the teachers' motivation brings out their innovative tendencies, and develops them professionally. The majority of past studies have followed the definition provided by Van der Vegt and Janssen (2003) on IWB, which is a process that consists of three stages. The first stage sees the intention to generate ideas. The second stage is where the ideas are promoted. The final stage is where the idea is realized. This process-based IWB definition is meant to occur while performing a work role or in a workgroup or organization, to benefit the role performance, the group, or the organization. IWB can also be described as an employee's self-initiated behavior in the generation, creation, development, application, promotion, realization, and modification of new ideas to enhance role performances (Konermann, 2012), or to gain rewards (Yeoh & Mahmood, 2013). Messmann and Mulder (2011) defined a teacher's IWB as an innovation performance with a broad repertoire of observation, elicitation and adaptation of ideas, development of strategic action, assessment by reflecting and evaluating, innovation adjustment, and ally formation.

Until now, most authors who studied innovation implementation at schools mainly focused on how teachers embraced and integrated ICT in the classroom while observing the cohort's behavior, specifically known as teachers' innovative behavior (Bourgonjon et al., 2013; Loogma et al., 2012). Several authors have focused on creativity to describe a teacher's innovative behavior (Chang et al., 2011; Yu et al., 2013). Some authors regarded teachers' changes and reflections of their professional practice as innovative behavior (Thurlings et al., 2015). Nevertheless, there remains a gap in the study of teachers' IWB and its antecedents (Thurlings et al., 2015). Existing studies on the teachers' cohort examined various factors that ranged from intrinsic factors such as openness, motivation, self-efficacy, and job satisfaction, to extrinsic factors such as function or task, work engagement, job control, creative requirements, and interaction within the job. In response, this study aims to extend the knowledge on how teamwork, humor, and principal support, affect teachers' IWB (Messmann & Mulder, 2014). A deeper understanding of the interaction of the selected variables will inform the development of environments that can stimulate the teacher's motivation so that their IWB can be activated and supported.

2.2 Teamwork and IWB of Teachers

Teamwork can be described as a collaboration of individuals in a cooperative environment, with effective and mutual relationships to achieve common team goals through the sharing of knowledge and skills (Park et al., 2005). Teachers' teamwork can be referred to as the collaboration of

a group of teachers in their school, who are committed to the school's success and their student's academic performance, by working together effectively and creating a positive work environment at school through effective communication, support, caring relationships, and sharing of knowledge and skills. Previous studies have shown that teamwork is associated with innovative behavior. According to Hong et al. (2005), increasing communication in a cooperative climate and networking between colleagues may encourage the generation of creative ideas. Successful teamwork also encourages team members to put into effect out-of-the-box methods to address work efficacy, to develop best practices, to take action to problem-solving, and to welcome changes, adopt innovations, and foster creativity (Budijanto, 2013).

Several studies have examined the influence of teachers' relationships with colleagues at school based on their innovative behavior. Borasi and Finnigan (2010) observed that networking and sharing, as well as articulating visions, can support teachers in the innovation processes. Mushayikwa and Lubben (2009) added that networking strategy is important for teachers to innovate in environments where resources are scarce. Nijland et al. (2018) listed studies that found that communicating with other teachers can affect teachers' innovative behavior, specifically in the idea promotion stage (Lim et al., 2020). On the same note, other researchers suggested that forming small groups allows teachers to express themselves by sharing, discussing, and reflecting on their thoughts and ideas during the stage when their ideas are being implemented (Horng et al., 2005). These findings underscore the importance of team interactions among teachers in stimulating their innovative behavior. Thus, we proposed that:

Hypothesis 1. There is a positive relationship between teamwork and teachers' innovative work behavior.

2.3 Humor and IWB of Teachers

Pyrczak (1998) defined humor as "a form of communication that draws laughter or attention towards something amusing". In other words, humor is "anything that people say or do that is considered funny, and tends to make others laugh" (Goh et al., 2020). In teaching practices, the use of humor is not limited to jokes or comical stories, but may also include the use of funny props, puns, short stories, anecdotes, riddles, or cartoons. Numerous studies have shown that the use of humor by teachers improves pedagogy, since the learning environment is more positive, fun, and interesting, thus leading to the desired classroom and student engagement outcomes (Deviney et al., 2013; Khairina et al., 2020). Bolkan et al. (2018) added that the integration of humor into classrooms should be in a manner where the values of inclusivity, openness, and respect are observed between teachers and students.

Researchers observed that when employees used their sense of humor in their working roles, they pushed the boundaries of innovation and organizational outcomes (Shanti & Jaafar, 2021). Other studies found that diverse humor styles were associated with innovative behavior, creativity, and productivity (e.g., Amjed & Tirmzi, 2016). These findings were consistent with Rex Jung's observation, in his capacity as both an assistant research professor of neurosurgery, and a practicing clinical neuropsychologist. He stated that humor and lightened mood are two essential aspects for innovators when they were amid creativity, ideation, and solving problems. Therefore, we present the following:

Hypothesis 2. There is a positive relationship between humor and teachers' innovative work behavior.

2.4 Principal Support and IWB of Teachers

The success of an institution and the role of the school principal are mutually inclusive and interdependent. Principals provide stewardship of new ideas, as well as support, and motivate teachers in enhancing their knowledge and skills (Hallinger & Lee, 2013). Nellitawati (2018) further extended the role of school principals, such that as innovators, they are powerful change agents in the organization, where he or she stewards the staff towards the completion of quality tasks. Other researchers suggested that school principals should not only provide new, creative, and insightful intellectualization to realize the school's vision and mission, but they must carry out their role to the best of their abilities (Soleimani & Tebyanian, 2011).

Kidwall et al. (2013) described an innovative school principal as someone who could transfer knowledge, by utilizing sharing case studies when seeking new solutions to current problems. Essentially, the principal as such is not described as a 'one-man or one-woman show', where he/she

dominates or works in a silo. Instead, the ideal role of a principal is a delegative and integrative one. When a school principal delegates, he/she entrusts staff to complete tasks. When a school principal performs an integrative role, he/she includes and blends in various educational and enrichment activities to the core activities in school. Additionally, Winter (2000) indicated that the principal of the school must demonstrate objectivity and the ability to rationalize using scientific principles. In an Indonesian study, Indra et al. (2020) supported the observation that the role of a headmaster improves the professionalism of the teaching staff, thus demonstrating the importance of role implementation on the part of the school principal. Finally, Gkorezis (2016) highlighted that school principals provide leadership for empowering and enhancing the IWB of the teachers. Thus, we formulated the following:

Hypothesis 3. There is a positive relationship between principal support and teachers' innovative work behavior.

3. Research Methodology

3.1 Sample and data collection

Data collection was conducted using a survey, where the respondents completed a self-administered questionnaire. The population of the study consisted of teachers, who were teaching at five selected secondary schools located in Selangor. Purposive sampling method was used for school selection and the students were selected through simple random sampling. We employed a G*Power to determine the appropriate sample size (Faul et al., 2009). Based on the G*Power (V.3.1.9.4) calculations, the sample size of this study was 354 at a 95 percent statistical power, with a small effect size (0.05), 0.05 significance level, and three (3) predictors. Before the distribution of the final questionnaire, we ran pilot questionnaires to ensure the length appropriateness, the clarity of instructions, and the intelligibility of the language and wording of the Malaysian version.

3.2 Instrument development

The 15-item teamwork scale is an integration of the Teacher Collaboration Assessment Survey (TCAS) (Woodland et al., 2013), with two other scales developed by Ladd and Henry (2000), respectively. This scale classifies teamwork into effective communication, support, and caring relationships, as well as knowledge and skill sharing. Sample items are "my co-workers always share and discuss emerging ideas to improve teaching and learning practices" and "my co-workers always value effective listening and communications that serve group needs". Cronbach's alpha value was 0.95. Humour was measured using Askildson's (2005) 10-item scale. A sample item is "I always use humor to gain my students' attention in the classroom". Cronbach's alpha score was 0.93. The scale measured the principal's support, and it consisted of 10 items. This scale categorized the support of school principals across four sub-categories, namely emotional, encouragement, informative, and instrumental. A sample item is "the school principal is always respectful of my goals and beliefs". The reliability value score was 0.895. The IWB measurement was adopted from Janssen's (2000) 15-item scale, which classified innovative behavior into idea generation, idea promotion, and idea implementation. Sample items are " I always systematically introduce innovative ideas into work practices" and "I like to search out new working methods, techniques or instruments to do things at work". The reliability value score was 0.963. The instruments provided a five-point Likert scale to measure the positive or negative responses, ranging from strongly agree to strongly disagree. The instruments were openly published on the web and reproduced in previous articles (e.g., Edinger, 2017, Bieg & Dresel, 2018, Afsar et al., 2019). The author has attempted to seek permission for the use of the instruments.

4. Data Analysis

Respondents were asked to complete the questionnaire at their own pace, with no set time limit given. The researchers proceeded with data analysis using the Statistical Package for Social Science

(SPSS V.26.0). The data were analyzed using descriptive statistics, Pearson's correlation coefficients, and regression analysis.

4.1 Sample population profile

The size of the sample was large enough to distinguish differences (Burmeister & Aitken, 2012). For this research, a total of 354 teachers answered the questionnaire, where 81.4% were female. The reason for the higher number of female respondents was because the population of female teachers in Malaysia was higher than the male teachers (Ministry of Education, 2017). In terms of age, the largest group was made up of teachers aged from 36 to 40 years old (n=88, 24.9%). The second largest group were those between 30 and 35 years old (n=84, 23.7%). This was followed by 59 respondents, who were between 41 and 45 years old (16.7%), 52 respondents who were between 46 and 50 years old (14.7%), 51 respondents who were above 51 years old (14.4%), and only 20 respondents who were below 30 years old (5.6%). In terms of teaching, 30.8% respondents professed to have 11 to 15 years of teaching experience (n=109), followed by 21.2% with 6 to 10 years (n=75), 18.6% with 16 to 20 years (n=66), 11.6% with 21 to 25 years (n=41), 11.3% with more than 25 years (n=40), and only 6.5% with less than 6 years of teaching experience (n=23). The majority of respondents hold an undergraduate degree (64.1%, n=227). This was followed by 77 respondents with postgraduate teaching course/ diploma in postgraduate education program (21.8%), 23 respondents with a master's degree (6.5%), 21 respondents with a diploma (5.9%), 5 respondents with teaching certificates (1.4%), and only 1 respondent with a Ph.D. (0.3%).

5. Results

5.1 Descriptive statistics and correlation

The descriptive analysis showed that the respondents rated principal support (M=3.93) the highest, followed by humor (M=3.97), while the lowest was teamwork (M=3.82) (see Table 1). Each independent variable was positively associated with the teacher's IWB, and a significant correlation between all variables was indicated with scores ranging from 0.423 to 0.577. Before testing the three hypotheses, a normality estimation was conducted to verify the normality of the data distribution. Data distribution normality was confirmed by the skewness being reported to be from -1.768 to .397, which was well within the -2 and +2 range (Tabachnick & Fidell, 2013). The kurtosis was reported to be from -.696 to 1.369, also within the -7 and +7 criterion range (Byrne, 2016).

Table 1. Descriptive statistics and correlation

Measure	Mean	*SD*	1	2	3	4
1.IWB	3.84	.393	1			
2.HUM	3.97	.425	.514**	1		
3.TW	3.82	.535	.577**	.379**	1	
4. PS	3.93	.548	.426**	.359**	.423**	1

Note: IWB, innovative work behavior; HUM, Humour; TW, teamwork; PS, principal support. 1= innovative work behavior; 2= Humour; 3= teamwork; 4= principal support.
***Correlation is significant at 0.05 and 0.01 levels (two-tailed), respectively.

5.2 Regression analysis

To test the proposed hypotheses, we performed regression analysis to estimate the relationship between the teacher's IWB and the independent variables (see Figure 1). Tables 2 present the regression results of humor, teamwork, and principal support towards the teacher's IWB, as the dependent variable. The analysis reported a positive and significant correlation between teamwork and IWB (β =.398, p<0.01), principal support and IWB (β =.107, p<0.01), and humor and IWB (β =.310, p<0.01). We can say that these findings are as expected. Finally, Table 2 showed about 45.1% of IWB can be deduced by teamwork, principal support, and humor. Thus, the equation of the model was:

$$IWB = 1.101 + .368 \text{ TW} + .107 \text{ PS} + .223 \text{ H}$$

Table 2. The results of the regression coefficient

Model	Unstandardized coefficients		Standardized coefficients		
	B	*SE*	*β*	*T*	Sig
(constant)	1.101	.164		6.713	.000
TW	.368	.042	.398	8.761	.000
PS	.107	.033	.146	3.240	.001
HUM	.223	.032	.310	7.048	.000
	R	R^2	Adjusted R^2	SE of the estimate	
IWB	0.672	0.451	0.446	0.29	

Note. Dependent Variable: IW; IWB= innovative work behavior; HUM= Humour; TW= teamwork; PS= principal support

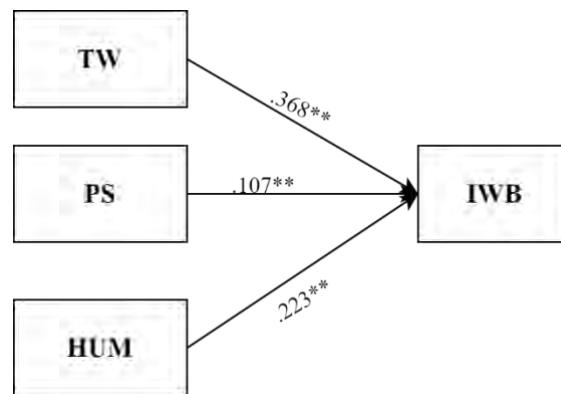**Fig 1**. Regression analysis results.
Note. IWB= innovative work behavior; HUM= Humour; TW= teamwork; PS= principal support

6. Discussion and Implications for Higher Education

The primary aim of the study was to investigate if teamwork, principal support, and humor affect a teacher's IWB. The results from the regression analysis showed that teamwork is significantly related to IWB. Hence, H_1 was accepted. This is consistent with the work of Watts et al. (2019), where increasing communication in a cooperative climate and networking between colleagues may encourage the generation of creative ideas. Successful teamwork also encourages team members to try out new methods to improve work effectiveness, to develop best practices, proactively solve problems, and welcome changes, adopt innovations and foster creativity (Magpili & Pazos, 2018). Similarly, this study supported prior studies by Bond-Barnard et al. (2018) and Desivilya et al. (2010), which stated that communication, which is fostered between diverse people in a team, can build collaborations that result in innovation. Accordingly, bringing diverse views to the table provides a spectrum of perspectives, upon processing them to enable informed decision-making, and boost work performance. The outcomes were increased performance and growth of innovative solutions (Mathieu et al., 2019). It would be helpful if teachers learned effective procedures for creative problem-solving via teamwork, to enhance their educational efforts. It is, therefore, useful to establish university courses for pre-service teachers on new collaborative innovation strategies, to encourage creativity in educational settings, and to apply collaborative creativity exercises in the classroom.

The present study also found that humor has a positive influence on IWB among school teachers. Thus, these findings support H_2. This study showed that the majority of the teachers were positive towards the integration of humor in their teaching technique, to induce laughter and amusement in the classroom, and to create a more positive, fun, and interesting learning environment for their students. These findings were consistent with previous studies that found when employees use humor

at work, they push the boundaries of innovation and organizational outcomes (Mesmer-Magnus et al., 2012). Other studies have also demonstrated how a repertoire of humor styles positively influences innovative behavior, creativity, and productivity (Amjed & Tirmzi, 2016; Cayirdag & Acar, 2010; Pundt, 2015). In terms of the use of pedagogical humor, this study supports that of Horng et al. (2005), which found that teachers' sense of humor determines the creative atmosphere and activity in the classroom. Similarly, this study supports prior studies by Nguyen (2014) that observed the usage of humor in teaching as an influential factor for creative teaching, as this technique was an innovative means for boosting the student's learning efficacy. In considering the field of education in general, teachers must be very well-prepared via pre-determined and defined certification processes, before they are permitted to teach in schools. The only prerequisite to be a teacher is (supposed) knowledge of the subject matter to be taught in universities, and an advanced degree in the particular discipline. Interestingly, we suggested humor be taught as an elective subject, or as part of the training course for pre-service teachers at the university level.

Finally, this study demonstrated that the principal's support is positively related to IWB, which underscores the important role principals play as 'knowledge-transfer agents' to his/her teaching staff, facilitating them to acquire and share knowledge. Therefore, H3 is supported. In particular, the findings of the present study showed that within this supportive environment, teachers would be encouraged to gather, apply or even advance their knowledge to improve teaching and learning processes and innovation. Supportive school principals are positive influencers towards the teachers' intrinsic growth, in particular their motivation, satisfaction, and interest at work. Therefore, the outcome is a school atmosphere that is conducive for IWB to flourish among teachers. These results are consistent with past studies on the effects of supervisor support on an employee's IWB (e.g., Khosravi et al., 2019). These findings are also aligned with the Leader-Member Exchange (LMX) theory, which explains that when the principal-teacher relationship develops, it moves from a formal to a higher-level bond, where the relationship quality embodies mutual trust, and respect, which provides more autonomy for teachers to make a decision, thus leading to greater creativity and innovation. In other words, greater resources and support from school principals help enhance IWB among teachers, as highlighted by Yuan and Woodman (2010). The results are in line with Mohammad and Harlech-Jones (2008), who stated that the absence of guidance and support could hinder teachers from implementing innovations. Similarly, this study supported the work by Binnewies and Gromer (2012), who suggested that the perceived supervisor support is a strong predictor of an ideal implementation behavior. There is plenty of space for developing collaborative university-school networks to professionalize school leadership, and support current secondary school principals, who have been especially interested in using the Education 4.0 climate to improve IWB among teachers.

7.   Limitations and Future Research

This study reported several limitations. The proposed research model examined a direct and linear relationship between the dependent variable and its antecedents. Therefore, the use of a cross-sectional design prevented the researchers from inferencing the causal relationships between the variables, in particular in determining which variable influenced the other. This constraint can be addressed with a longitudinal study approach, to look much deeper into the causality flow among the proposed variables.

This study also used self-assessment instruments, which may have caused common method bias (CMB). Stringent efforts were made to address the CMB effects, yet, using only one group of raters, that is the school teachers, to measure the dependent variable and its antecedents using the same instrument, may present latent concerns. Future studies could include other raters, namely school principals and co-workers, or perhaps utilize other available objective measures to assess the teacher's IWB, thereafter mitigating mono-method bias.

The final limitation of this study involved the number of factors examined. The factors were chosen based on previous empirical findings. Other factors may be relevant in predicting the teacher's IWB, as well and the deserved attention in future research works. Future research might examine other factors, such as professional orientation, teacher identity, teacher agency, and non-formal leadership, such as teacher leadership and distributed leadership.

8.   Conclusion

This study extended the literature on the associations of teamwork, principal support, humor, and IWB among Malaysian teachers at secondary schools. The findings indicated that all three proposed variables were significant influencers of the IWB. This study was among the first in the country to seek to understand the variables affecting the teachers' innovative behaviour, especially in educational settings. This new knowledge can be used as a guideline to create Education 4.0 environments in secondary schools, that provides social support for the teachers' IWB to flourish in faculties and classrooms. The research can also inform and compel the top management in higher education offices, to pursue fresh and unconventional strategies towards greater innovation in the education sector, and to align their educators' behavior at the frontline, with that of the national aspirations.

The findings of this research imply that institutions of learning and higher education offices must set an early platform that develops and encourages future teachers in aspects of teamwork, humour, and innovative work behavior. The introduction of the essence of warm elements such as teamwork and supportive interrelation among team members in creating innovative environments, as well as behavior, could gradually inculcate the right perspectives, attitudes, as well as actions, among future teachers of educational faculties and colleges. A study that involved 1,008 undergraduate students from five research universities in Malaysia has empirically reported that the innovation culture of an institution significantly and positively relates to the innovative behavior of the undergraduate students (Roffeei et.al., 2017). Hence, it is deemed that they shall continue to demonstrate what they have internalized during their tertiary education experiences, in their future workplaces.

9. References

Abd Ghani, N. A., Hussin, T. A. B. S. R., & Jusoff, K. (2009). Stimulating lecturers' innovative behaviour in Malaysian Polytechnics. *Academic Leadership Journal*, *7*(4), 11–16.

Afsar, B., Masood, M., & Umrani, W. A. (2019). The role of job crafting and knowledge sharing on the effect of transformational leadership on innovative work behavior. *Personnel Review*, *48*(5), 1186–1208.

Ahrari, S., Samah, B. A., Hassan, M. S. H. B., Wahat, N. W. A., & Zaremohzzabieh, Z. (2016). Deepening critical thinking skills through civic engagement in Malaysian higher education. *Thinking Skills and Creativity*, *22*, 121–128.

Amjed, A., & Tirmzi, S. H. S. (2016). Effect of humor on employee creativity with moderating role of transformational leadership behavior. *Journal of Economics, Business and Management*, *4*(10), 594–598.

Askildson, L. (2005). Effects of humor in the language classroom: Humor as a pedagogical tool in theory and practice. *Journal of Second Language Acquisition and Teaching*, *12*, 45–61.

Aziz, F., Md Rami, A., Razali, F., & Mahadi, N. (2020). The influence of leadership style towards technology acceptance in organization. *International Journal of Advanced Science and Technology*, 29(7), 218-225.

Baharuddin, M. F., Masrek, M. N., & Shuhidan, S. M. (2019). Innovative work behaviour of school teachers: A conceptual framework. *International E-Journal of Advances in Education*, *5*(14), 213–221. doi: 10.18768/ijaedu.593851

Bieg, S., & Dresel, M. (2018). Relevance of perceived teacher humor types for instruction and student learning. *Social Psychology of Education, 21*(4), 805–825.

Binnewies, C., & Gromer, M. (2012). Creativity and innovation at work: The role of work characteristics and personal initiative. *Psicothema*, *24*(1), 100–105.

Bolkan, S., Griffin, D. J., & Goodboy, A. K. (2018). Humor in the classroom: The effects of integrated humor on student learning. *Communication Education*, *67*(2), 144–164. doi:10.1080/03634523.2017.1413199

Bond-Barnard, T. J., Fletcher, L., & Steyn, H. (2018). Linking trust and collaboration in project teams to project management success. *International Journal of Managing Projects in Business*, *11*(2), 432–457. doi: 10.1108/IJMPB-06-2017-0068

Borasi, R., & Finnigan, K. (2010). Entrepreneurial attitudes and behaviors that can help prepare successful change-agents in education. *The New Educator*, *6*(1), 1–29. doi: 10.1080/1547688X.2010.10399586

Bourgonjon, J., De Grove, F., De Smet, C., Van Looy, J., Soetaert, R., & Valcke, M. (2013). Acceptance of game-based learning by secondary school teachers. *Computers & Education*, *67*, 21–35. doi:10.1016/j.compedu.2013.02.010

Budijanto, R. R. (2013). *Thinking Styles, Teamwork Quality and Performance* [PhD Thesis]. University of Canberra.

Burmeister, E., & Aitken, L. M. (2012). Sample size: How many is enough? *Australian Critical Care*, *25*(4), 271–274. doi: 10.1016/j.aucc.2012.07.002

Byrne, B. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. Routledge.

Carvalho, L., & Goodyear, P. (2018). Design, learning networks and service innovation. *Design Studies*, *55*, 27–53. doi: 10.1016/j.destud.2017.09.003

Cayirdag, N., & Acar, S. (2010). Relationship between styles of humor and divergent thinking. *Procedia - Social and Behavioral Sciences*, *2*(2), 3236–3240.

Chang, S., Gong, Y., & Shum, C. (2011). Promoting innovation in hospitality companies through human resource management practices. *International Journal of Hospitality Management*, *30*(4), 812–818. doi: 10.1016/j.ijhm.2011.01.001

Chen, J.-S., Tsou, H.-T., & Ching, R. K. (2011). Co-production and its effects on service innovation. *Industrial Marketing Management*, *40*(8), 1331–1346. https://doi.org/10.1016/j.indmarman.2011.03.001

Desivilya, H. S., Somech, A., & Lidgoster, H. (2010). Innovation and conflict management in work teams: The effects of team identification and task and relationship conflict. *Negotiation and Coflict Management Research*, *3*(1), 28–48.

Deviney, D. E., Crawford, J., & Elder, K. L. (2013). Classroom antics: Fun with a purpose. *Journal of Instructional Pedagogies*, *10*(1), 1–6.

Edinger, M. J. (2017). Online teacher professional development for gifted education: Examining the impact of a new pedagogical model. *Gifted Child Quarterly, 61*(4), 300–312.

Enzai, N. I. M., Ahmad, N., Ghani, M. A. H. A., Rais, S. S., & Mohamed, S. (2021). Development of Augmented Reality (AR) for Innovative Teaching and Learning in Engineering Education. *Asian Journal of University Education*, *16*(4), 99–108.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Gkorezis, P. (2016). Principal empowering leadership and teacher innovative behavior: A moderated mediation model. *International Journal of Educational Management*, *30*(6), 1030–1044.

Goh, H. S. E., Roslan, S., Baguri, E. M., Ong, S. Y., & Li, S. Y. (2020). The effects of children's friendship training on social skills and quality of play among children with autism spectrum disorder. *International Journal of Learning, Teaching and Educational Research*, *19*(7), 225–245. doi: 10.26803/ijlter.19.7.13

Göker, S. D., & Göker, M. Ü. (2020). Rethinking Innovative Learning Opportunities for Teachers in Educational Organizations toward Education 4.0. In E. S. Göker (Ed.), *A Closer Look at Organizational Culture in Action*. IntechOpen.

Hallinger, P., & Lee, M. (2013). Exploring principal capacity to lead reform of teaching and learning quality in Thailand. *International Journal of Educational Development*, *33*(4), 305–315. https://doi.org/10.1016/j.ijedudev.2012.03.002

Harkins, A. M. (2008). Leapfrog Principles and Practices: Core Components of Education 3.0 and 4.0. *Future Research Quality*, *24*(1), 19–31.

Hong, J.-S., Hong, J.-C., Lin, L. J. C., Chang, S.-H., & Chu, H.-C. (2005). Creative teachers and creative teaching strategies. *International Journal of Consumer Studies*, *29*(4), 352–358. doi: 10.1111/j.1470-6431.2005.00445.x

Horng, J.-S., Hong, J.-C., ChanLin, L.-J., & Chu, H.-C. (2005). Creative teachers and creative teaching strategies. *International Journal of Consumer Studies*, *29*, 352–358. doi: 10.1111/j.1470-6431.2005.00445.x

Hulse, B., & Owens, A. (2019). Process drama as a tool for teaching modern languages: Supporting the development of creativity and innovation in early professional practice. *Innovation in Language Learning and Teaching*, *13*(1), 17–30. doi: 10.1080/17501229.2017.1281928

Indra, R., Kustati, M., & Saregar, A. (2020). The effect of principals' leadership towards effective learning at an Indonesian secondary school. *European Journal of Educational Research*, *9*(3), 1063–1074.

Ismail, A., & Mydin, A. A. (2019). The impact of transformational leadership and commitment on teachers' innovative behaviour. *4th ASEAN Conference on Psychology, Counselling, and Humanities (ACPCH 2018)*, 426–430. doi: 10.2991/acpch-18.2019.100

Izzati, U. A. (2018). The relationships between vocational high school teachers ' organizational climate and innovative behavior. *Advances in Social Science, Education and Humanities Research*, *173*(1), 343–345. doi: 10.2991/icei-17.2018.91

Janssen, O. (2000). Job demands, perceptions of effort-reward fairness and innovative work behaviour. *Journal of Occupational and Organizational Psychology*, *73*(3), 287–302. doi: 10.1348/096317900167038

Khairina, K., Roslan, S., Ahmad, N., Zaremohzzabieh, Z., & Arsad, N. M. (2020). Predictors of resilience among Indonesian students in Malaysian universities. *Asian Journal of University Education, 16*(3), 169–182. doi: 10.24191/ajue.v16i3.11081

Khosravi, P., Newton, C., & Rezvani, A. (2019). Management innovation: A systematic review and meta-analysis of past decades of research. *European Management Journal*, *37*(6), 694–707.

Konermann, J. (2012). *Teachers' work engagement: A deeper understanding of the role of job and personal resources in relationship to work engagement, its antecedents, and its outcomes* [PhD Thesis]. University of Twente.

Ladd, D., & Henry, R. A. (2000). Helping Coworkers and Helping the Organization: The Role of Support Perceptions, Exchange Ideology, and Conscientiousness. *Journal of Applied Social Psychology*, *30*(10), 2028–2049.

Lambriex-Schmitz, P., Van der Klink, M. R., Beausaert, S., Bijker, M., & Segers, M. (2020). Towards successful innovations in education: Development and validation of a multi-dimensional Innovative Work Behaviour Instrument. *Vocations and Learning*, *13*, 1–28. doi: 10.1007/s12186-020-09242-4

Lee, J., Kao, H.-A., & Yang, S. (2014). Service innovation and smart analytics for industry 4.0 and big data environment. *Procedia Cirp*, *16*, 3–8.

Liebowitz, D. D., & Porter, L. (2019). The effect of principal behaviors on student, teacher, and school outcomes: A systematic review and meta-analysis of the empirical literature. *Review of Educational Research*, *89*(5), 785–827. doi: 10.3102/0034654319866133

Lim, B. C.-Y., Liu, L. W.-L., & Choo, C.-H. (2020). Investigating the effects of interactive e-book towards academic achievement. *Asian Journal of University Education*, *16*(3), 78–88. doi: 10.24191/ajue.v16i3.10272

Loogma, K., Kruusvall, J., & Ümarik, M. (2012). E-learning as innovation: Exploring innovativeness of the VET teachers' community in Estonia. *Computers & Education*, *58*(2), 808–817. doi: 10.1016/j.compedu.2011.10.005

Magpili, N. C., & Pazos, P. (2018). Self-managing team performance: A systematic review of multilevel input factors. *Small Group Research*, *49*(1), 1–31.

Mathieu, J. E., Gallagher, P. T., Domingo, M. A., & Klock, E. A. (2019). Embracing complexity: Reviewing the past decade of team effectiveness research. *Annual Review of Organizational Psychology and Organizational Behavior*, *6*, 17–46.

Mesmer-Magnus, J., Glew, D. J., & Viswesvaran, C. (2012). A meta-analysis of positive humor in the workplace. *Journal of Managerial Psychology*, *27*(2), 155–190.

Messmann, G., & Mulder, R. H. (2014). Exploring the role of target specificity in the facilitation of vocational teachers' innovative work behaviour. *Journal of Occupational and Organizational Psychology*, *87*(1), 80–101. doi: 10.1111/joop.12035

Messmann, Gerhard, & Mulder, R. H. (2011). Innovative work behaviour in vocational colleges: Understanding how and why innovations are developed. *Vocations and Learning*, *4*(1), 63–84. https://doi.org/10.1007/s12186-010-9049-y

Messmann, Gerhard, Mulder, R. H., & Palonen, T. (2018). Vocational education teachers' personal network at school as a resource for innovative work behaviour. *Journal of Workplace Learning*, *30*(3), 174–185. doi:10.1108/JWL-08-2017-0069

Ministry of Education. (2013). *Malaysia Education Blueprint 2013–2025*. Ministry of Education. http://www. moe.gov.my/cms/upload_files/articlefile/2013/articlefile_file_003108.pdf.

Ministry of Education. (2017). *Malaysia Educational Statistics*. Ministry of Education.

Mohammad, R. F., & Harlech-Jones, B. (2008). Working as partners for classroom reform. *International Journal of Educational Development*, *28*(5), 534–545.

Mohd Roffeei, S. H., Kamarulzaman, Y., & Yusop, F. D. (2017). Inculcating innovative behavior among students: Determinants of innovation culture in Malaysian higher education. *Malaysian Online Journal of Educational Management,* 5(4), 1-17.

Mushayikwa, E., & Lubben, F. (2009). Self-directed professional development–Hope for teachers working in deprived environments? *Teaching and Teacher Education*, *25*(3), 375–382. doi: 10.1016/j.tate.2008.12.003

Nellitawati, N. (2018). Motivation and innovation role of school's principal in improving teacher professionalism. *COUNS-EDU: The International Journal of Counseling and Education*, *3*(2), 48–56.

Nguyen, H. (2014). *The use of humor in EFL teaching: A case study of Vietnamese university teachers' and students' perceptions and practices* [Postgraduate Thesis]. The University of Canberra.

Nijland, F., van Amersfoort, D. L., Schreurs, B., & de Laat, M. F. (2018). Stimulating Teachers' Learning in Networks: Awareness, Ability, and Appreciation. In *Networked By Design: Interventions for Teachers to Develop Social Capital*. Routledge.

Park, S., Henkin, A. B., & Egley, R. (2005). Teacher team commitment, teamwork and trust: Exploring associations. *Journal of Educational Administration*, *43*(5), 462–479. doi: 10.1108/09578230510615233

Puncreobutr, V. (2016). Education 4.0: New challenge of learning. *St. Theresa Journal of Humanities and Social Sciences*, *2*(2), 92–97.

Pundt, A. (2015). The relationship between humorous leadership and innovative behavior. *Journal of Managerial Psychology*, *30*(8), 878–893.

Pyrczak, F. (1998). *Statistics With a Sense of Humor*. Pyrczak Publishing.

Samson, A. C., & Gross, J. J. (2012). Humour as emotion regulation: The differential consequences of negative versus positive humour. *Cognition & Emotion*, *26*(2), 375–384. doi: 10.1080/02699931.2011.585069

Schippers, M. C., West, M. A., & Dawson, J. F. (2015). Team reflexivity and innovation: The moderating role of team context. *Journal of Management*, *41*(3), 769–788. doi:10.1177/0149206312441210

Sinkeviciute, V. (2019). The interplay between humour and identity construction: From humorous identities to identities constructed through humorous practices. *Journal of Pragmatics*, *125*, 127–131. https://doi.org/10.1016/j.pragma.2019.07.005

Soleimani, N., & Tebyanian, E. (2011). A Study of the Relationship between Principals' Creativity and Degree of Environmental Happiness in Semnan High Schools. *International Conference on Education and Educational Psychology (ICEEPSY 2011)*, *2*.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (International edition). Pearson.

Thurlings, M., Evers, A. T., & Vermeulen, M. (2015). Toward a model of explaining teachers' innovative behavior: A literature review. *Review of Educational Research*, *85*(3), 430–471. doi:10.3102/0034654314557949

Van der Vegt, G. S., & Janssen, O. (2003). Joint impact of interdependence and group diversity on innovation. *Journal of Management*, *29*(5), 729–751. https://doi.org/10.1016/S0149-2063_03_00033-3

Watts, L. L., Steele, L. M., Medeiros, K. E., & Mumford, M. D. (2019). Minding the gap between generation and implementation: Effects of idea source, goals, and climate on selecting and refining creative ideas. *Psychology of Aesthetics, Creativity, and the Arts*, *13*(1), 2–14.

Widmann, A., & Mulder, R. H. (2018). Team learning behaviours and innovative work behaviour in work teams. *European Journal of Innovation Management*, *21*(3), 501–520. doi: 10.1108/EJIM-12-2017-0194

Winter, S. G. (2000). The satisficing principle in capability learning. *Strategic Management Journal*, *21*(10–11), 981–996.

Woodland, R., Lee, M. K., & Randall, J. (2013). A validation study of the teacher collaboration assessment survey. *Educational Research and Evaluation*, *19*(5), 442–460. https://doi.org/10.1080/13803611.2013.795118

Yeoh, K. K., & Mahmood, R. (2013). The relationship between pro-innovation organizational climate, leader-member exchange and innovative work behavior: A study among the knowledge workers of the knowledge intensive business services in Malaysia. *Business Management Dynamics*, *2*(8), 15–30.

Yu, C., Yu, T.-F., & Yu, C.-C. (2013). Knowledge sharing, organizational climate, and innovative behavior: A cross-level analysis of effects. *Social Behavior and Personality: An International Journal*, *41*(1), 143–156. https://doi.org/10.2224/sbp.2013.41.1.143

Yuan, F., & Woodman, R. W. (2010). Innovative behavior in the workplace: The role of performance and image outcome expectations. *Academy of Management Journal*, *53*(2), 323–342.

Zuraik, A., & Kelly, L. (2019). The role of CEO transformational leadership and innovation climate in exploration and exploitation. *European Journal of Innovation Management*, *22*(1), 84–104. https://doi.org/10.1108/EJIM-10-2017-0142