

# Journal of Global Management Research

Vol. 14 No. 1 June 2018



International theoretical  
and applied perspective

Research conducted  
throughout the world

On management, social,  
and technology issues



<http://gmrjournal.uqam.ca/>

ISSN 2367-962X

# Journal of Global Management Research

This journal strives to publish original articles of major interest to academicians, managers, consultants, politicians, teachers, and students. This journal is published twice a year, in December and June. Special issues are released following an international conference or devoted to a special theme. All papers submitted to the journal are subject to strict review by the Editor followed by double blind peer review.

## Editorial Review Board

### EDITOR-IN-CHIEF:

Dr. William Raynor, III.  
State University of New York  
Tel 1 (607) 746-4387  
Email: wraynor124@aol.com

### ASSOCIATE EDITORS

Dr. Matthew KUOFIE, College Of Applied Science And Technology, Illinois (USA)  
Dr. Pascal PECQUET, professeur, Université de Montpellier (France)

## INTERNATIONAL EDITORIAL REVIEW BOARD

- Lili Zheng, Groupe Sup de Co La Rochelle (La Rochelle Business School) (France)
- Dr. Lucila PÉREZ, director, Graduate Studies Department, University CASA GRANDE, (Ecuador)
- Dr. Lin YANNING, Université de Paris I (Panthéon - Sorbonne), avocate à Beijing (Chine)
- Dr. Jameleddine ZIADI, Enseignant-chercheur, Faculté des Sciences Economiques et de Gestion de Tunis (Tunisie), président du World E-Management Consortium
- Dr. Pierre SALENGROS, Université libre de Bruxelles
- Julian MIRANDA, Universidad Autonoma de Guerrero, (JULIAN6154@aol.com)
- Dr. Raymond A. HACKNEY (Manchester Metropolitan University Business School)
- Dr. Geni Satiko SATO, Researcher at the IEA-Agriculture Economy Institut, and Mackenzie Presbyterian University
- Dr. Paul CHAVEZ, U of Mary Washington, (rchavez@umw.edu)
- Dr. Roberto Giro MOORI, Mackenzie Presbyterian University (rgmoori@mackenzie.com.br)
- Dr. Samer HIJAZI, Florida Keys Community College (hijazi\_s@fkn.edu)
- Ernesto OIEDA, Universidad de Carabobo, Venezuela , [ernestoo@telcel.net.ve](mailto:ernestoo@telcel.net.ve)

### PUBLISHER:

Institut Fidal Inc.  
CP 32089 Montréal, H2L 4Y5  
URL=<http://fidal.qc.ca>

Technical Director : Charicris Aurita Pandanon  
Operating editor : Michel plaisent  
**WebMaster Marc-André ROBERT**

## TABLE OF CONTENT

<b>ARTICLES</b>	<b>PAGES</b>
<b>Qasim Ali Nisar , Muhammad Azeem and Dr. Che Azlan Bin Taib</b>  <b>RELATIONSHIP AMONG PERCEIVED TRANSFORMATIONAL LEADERSHIP, FOLLOWERS' EMOTIONAL REACTIONS, FOLLOWERS' EMOTIONAL ENGAGEMENT AND JOB ATTITUDES</b>	<b>5</b>
<b>Caren Casama Orlanda-Ventayen, Randy Joy Magno Ventayen</b>  <b>E-LEARNING ROLE OF SOCIAL MEDIA IN EDUCATION</b>	<b>13</b>
<b>Kenichi Sasaki, Nelson T. Diaz, and Patrick Jann I. Brazal</b>  <b>SCHOOL-BASED IMPLEMENTATION OF PANTAWID PAMILYANG PILIPINO PROGRAM AND ITS SHORT-TERM EFFECTS IN A SELECTED SECONDARY SCHOOL</b>	<b>19</b>
<b>Phyu Sin Thant, Adam B Puteh, Uma Rani Sinniah, Mohd Firdaus Bin Ismail</b>  <b>EFFECT OF PRIMING ON PHYSIOLOGICAL AND CHROMOSOMAL CHANGES OF AGED SOYBEAN SEEDS</b>	<b>25</b>



# RELATIONSHIP AMONG PERCEIVED TRANSFORMATIONAL LEADERSHIP, FOLLOWERS' EMOTIONAL REACTIONS, FOLLOWERS' EMOTIONAL ENGAGEMENT AND JOB ATTITUDES

Qasim Ali Nisar<sup>1</sup>, Muhammad Azeem<sup>2</sup> and Dr. Che Azlan Bin Taib<sup>3</sup>

<sup>1,2</sup>PhD Scholar, College of Business, Universiti Utara Malaysia

Associate Professor<sup>3</sup>, Universiti Utara Malaysia

[qasimalinisar@yahoo.com](mailto:qasimalinisar@yahoo.com), [azeeminpk@gmail.com](mailto:azeeminpk@gmail.com), [c.azlan@uum.edu.my](mailto:c.azlan@uum.edu.my)

## ABSTRACT

The purpose of study is to examine the relationship among perceived transformational leadership, followers' emotional reactions, followers' emotional engagement and job attitudes. Study is descriptive and quantitative in nature. Questionnaire survey method adopted to collect the responses. A sample of 150 respondents collected out of 170 respondents within the period of one month by using simple random sampling technique. Findings showed that perception of followers regarding transformational leadership significantly and positively related with followers' emotional engagement, followers' positive attitudes and followers' job attitudes. Followers' positive emotional reactions and their emotional engagement also have positive association with job attitudes but followers' negative emotional reactions have negative relationship with job attitudes. This study will help to visualize the key role of followers' emotional reaction and transformational leadership to engage employees emotionally and to make them satisfy.

**KEYWORDS:** Transformational Leadership, Emotional reactions, Emotional Engagement, Job Attitudes

## 1. Introduction

In this era of knowledge transformation, human relations development considered essential element because society rapidly rearranging its worldwide basic values and social structure. Human resources considered most valuable and crucial factor to obtain the effective, smooth and efficient results within organizations (Masodragh, 2003). In this challenging environment leadership extensively recognized as key to providing people with visions and responding to organizational demands (Melum, 2002). Transformational leadership allows employees to solve issues with different angles with a view to utilize their creative thinking and probe effective solutions of problems. Empirical & theoretical research proposed that perception of employees regarding transformational leadership influence their emotional engagement and job attitudes. Organizations need effective strategies and influencing leadership styles to meet these challenges. Employees' emotional engagement considered an effective tool to make them more productive.

In Global scenario organizations adopting transformational leadership style with a view to emotionally engage their employees to maximize the profitability & productivity which can leads to gain the competitive advantage. Now multinational companies shifting initiating structure, consideration and transactional leadership styles to transformational leadership due to its effectiveness in employees' satisfaction. Organizations realize that, followers' emotional reactions and emotional engagement is need of time to move their job attitudes in positive directions. (Zhu *et al.*, 2005).

The aim of current study is to analyze relationship among perceived transformational leadership, followers' emotional reactions, emotional engagement and follower's job attitudes. Study is descriptive and quantitative in nature.

## 2. Literature Review

### 2.1 Transformational Leadership and Followers' Emotional Engagement

Perceived transformational leadership significantly affect followers' emotional engagement (Zhu *et al.*, 2009; Bass, 1985; 2005;). (Avolio, 1999; 2005; Bass, 1985,) explained that three types of emotional engagement influenced by followers' perceived transformational leadership (Zhu *et al.*, 2009; Kahn, 1990). Transformational leaders provide

support and care about followers' needs for effective growth and develop interaction with each follower (Bass, 1985) due to which followers' feel high level of psychological safety (Kahn, 1990; Bono *et al.*, 2007) and supervisor support (Bass, 1985; Avolio, 1999; Eisenberger, Hutchison, & Sowa and Huntington, 1986). By applying the inspirational motivational behavior, transformational leaders develop a challenging, inspiring & motivating vision and create link between followers' work activities and their beliefs and values (Bono and Judge, 2003). Transformational leadership enhances the follower's feelings of meaningfulness, availability and psychological safety due to which followers' fully emotionally engaged in their work activities. Zhu *et al.* (2009) Leadership with transformational style and employees job engagement significantly related to each other. Following hypothesis has been proposed in the light of above literature.

**H1:** Perceived Transformational Leadership positively and significantly related to Employees Emotional Engagement.

## 2.2 Followers' Emotional Reactions and Followers' Emotional Engagement

Researchers proposed that followers' emotional reactions significantly effects their emotional engagement (Meyer et al., 1992; Bower, 1981) Mood Judgmental model described that employees perceive positively about themselves and others while in positive moods and vice versa for negative moods. According to Mood Judgmental model concluded that followers' who repeatedly experience positive feelings and emotions will have positive moods and positive vision regarding their capabilities and skills. (Seo et al.2004). So employees have strong work engagement and willingness to emotionally involve their selves in their work roles. Similarly if followers' have negative emotional reactions their emotional engagement will not be strong and they can't accomplish their defined works. Furthermore followers' emotional resources will be influenced by followers' negative or positive emotional experience (Kahn, 1990). Followers' have higher emotional energy during their work roles if experienced positive emotions and in contrast if they met negative emotions experience, felt irritation & tiredness performing work roles and felt low emotional energy (Hobfoll, 1989; Fredricksons, 1998). Following hypothesis has been proposed in the light of above literature.

**H2a:** Followers' positive emotional reactions have significant and positive relationship with followers' emotional engagement.

**H2b:** Followers' negative emotional reactions have significant and negative relationship with followers' emotional engagement.

## 2.3 Transformational Leadership and Job Attitudes

Leaders play vital role in determining the employees work experience and also significantly related with employees' job satisfaction (Yukl, 2010; Wang, Courtright & Seibert, 2011; hamidifar, 2009) Similarly Miles & Mangold (2002) described that effective supervision, interaction with employees and leaders' performance enhances job satisfaction. Leader's abilities to recognize and solve employees' issues determine the employees' perception regarding leader performance. According to transformational leadership theory, leaders encourage their subordinates to work for organizational prosperity by infusing a long term vision. (Burns, 1978; Bass, 1985; House, 1977). When followers' perceive their leader as a transformational, the followers' will have a sense of belongingness and loyalty (Kennedy & Anderson, 2002) which creates passions (Bono et al. 2007) so employee's satisfaction level increased at their workplace. Transformational leadership related with followers' job satisfaction (Low et al., 1996; Judge & Piccolo, 2004). Hakan et al. (2008) proposed that transformational leadership significantly related to organizational identification. Transformational leadership enhances the employees' organizational identification. Transformational leadership behavior significantly contribute to exploratory innovation (Jansen et al, 2009). Followers' Job satisfaction significantly affected by transformational leadership (Al-Hussami, 2008). Organizational identification means that feelings of belongingness with organization (Ashforth and Mael, 1989). Transformational leadership and organizational identification positively correlated and associated with each other (Wang and Rode, 2010; Walumbwa, Avolia & Zhu, 2008). More a leader is transformational to be perceived, followers' sense of closeness become higher within their group (Kark, Shamir & Chen, 2003).

**H3:** Perceived Transformational Leadership positively and significantly related with job attitudes.

## 2.4 Followers' Emotional Engagement & Followers' Attitudes

Different theorists (Rich et al. 2010; Kahn, 1990) focused on impact of job engagement on job performance and job satisfaction influenced by followers' emotional engagement. Emotional engagement may have significant

relationship with job satisfaction when follower emotionally attached in their work role and successfully complete given tasks (Rich et al., 2010). Similarly emotional engagement also positively related with organizational identification. Employees with emotional engagement focused on their individual roles as well as overall organizational success. Employees combine their individual tasks and identity to their group identity and have higher level of organizational identification (Self, Vandenberg, & SEO, 1994)

**H4:** Followers' Emotional Engagement has significant relationship with Followers' Attitudes.

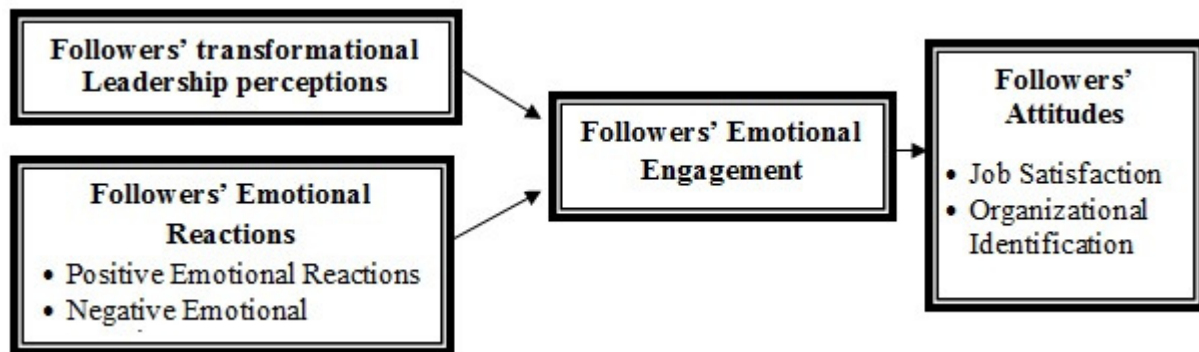
## 2.5 Followers' Emotional Reactions & their Attitudes

Followers' emotional reactions effects their attitudes and performance (Bower, 1981; Kleff et al.2009; Schwarts & Clore, 1983). Positive reactions significantly and positively associated with job satisfaction and organizational identification and similarly negative emotional reactions negatively significantly related to followers' job attitudes. Experience of continues positive emotions during work create good job experience(Weis & Cropanzano, 1996) so followers' who continuously experience positive reactions during work are more satisfied with their jobs and also highly identified with their organizations.

**H5:** Followers' Positive Emotional Reactions have Positive relationship with Followers' Attitudes

**H6:** Followers' Negative Emotional Reactions have negative relationship with Followers' Attitudes

### Theoretical Framework



## 3. Method

### 3.1 Participants and Procedure

Study conducted in telecommunication sector and target population includes all the employees of call centers in Lahore. Sampling frame includes employees of 5 major call centers. Data collected by using simple random sampling techniques. List of all employees taken from HR managers of all call centers and then choose sample units randomly. Sample size was 170. Questionnaires floated in five call centers. Out of 170 questionnaires only 150 were valid responded with 82% response rate.

### 3.2 Measures

Followers' perception regarding transformational leadership measured with Multifactor Leadership Questionnaire (MLQ Form-5X; Bass & Avolio, 1995). The scale widely adopted to measure the transformational leadership. (MLQ measure the idealized influence with eight items scale and other three types measured with 4 items scales. Scale of Van Kleff et al. (2009) & Bono et al. (2007) was adopted to measure the positive and negative reactions of followers. Van Kleff et al. (2009) scale used for affective reaction and Bono et al. (2007) scale used for positive and negative emotions. Additionally, 4 items scale of May et al. (2004) adopted to collect the responses regarding emotional engagement. To collect data about job satisfaction three items scale of (Edwards & Rothbard's (1999) was used. Mael & Ashforth' (1992) 6 items scale used to measure the organizational identification.

#### 4. Results

The basic aim of study is to check relationship among perceived transformational leadership, followers' emotional reactions, emotional engagement and follower's job attitudes. Mean values, standard deviation and correlations among variables shown in **Table 1**. Mean values for perceived transformational leadership, followers' emotional engagement, followers' positive emotional reactions, negative emotional reaction and job attitudes are 1.96, 2.38, 1.79, 4.10 and 1.95 respectively. Similarly standard deviation values for all above mentioning variables are 0.36, 0.32, 0.38, 0.37 and 0.37 respectively. **Table 1** showing correlation among all under study variables. Perceived transformational leadership, followers'. Emotional engagement, followers' positive attitudes and followers' negative attitudes are correlated with followers' job attitudes with  $r = 0.812$ ,  $r = 0.287$ ,  $r = 0.370$  and  $r = -0.226$  respectively. Similarly, Perceived transformational leadership, followers' positive attitudes and followers' negative attitudes are correlated with followers' emotional engagement with  $r = 0.812$ ,  $r = 0.287$ ,  $r = 0.370$  and  $r = -0.226$  respectively. It means that perceived transformational leadership is highly correlated with followers' job attitudes. Followers' negative emotions have negative correlation with job attitudes.

**In Table II** research hypothesis tested by applying regression analysis. Hypothesis 1 described that perceived transformational leader has positive and significant relationship with followers' emotional engagement. Perceived transformational leadership has positive and significant relation with followers' emotional engagement ( $F=17.79$ ,  $R$  square= $11\%$ ,  $p < .01$ ) so hypothesis 1 supported by results. The p value for beta coefficient of perceived transformational leadership is 0.00. The p value is significant at 1% level of significance this means beta, 0.33, is statistically significant.  $R^2$  gives the proportion of variance in the dependent variable accounted for by the independent variable. Similarly Hypothesis 2a and 2b related to followers' positive and negative emotional reactions respectively. Hypothesis 2a suggested that followers' positive emotional reactions should be positively and significantly related to followers' emotional engagements. Thus Hypothesis 2a is supported. **Table 2** showed that Followers' negative emotional reactions have negative and significant relationship with followers' emotional engagement ( $F=23.73$ ,  $R$  square= $14\%$ ,  $p < .01$ ,  $\beta = -0.37$ ). Hence Hypothesis 2b also supported.

In additions hypothesis 3 tested and **Table II** show that perceived transformational leadership has positive and significant relationship with job attitudes. ( $F=17.91$ ,  $R$  square= $72\%$ ,  $p < .01$ ,  $\beta = .76$ ) so hypothesis 3 also supported by results. Here,  $R^2$  is 0.72. This implies a very good model as independent variable explains only 72% of variance in dependent variable. Similarly, Hypothesis 4 suggested that there should be positive and significant relationship between followers' emotional engagement and job attitudes. **Table III** showed that followers' emotional engagement has positive and significant relationship with followers' job attitudes which include job satisfaction and organizational identification. ( $F=13.34$ ,  $R$  square= $8\%$ ,  $p < .01$ ,  $\beta = -0.37$ ) so Hypothesis 4 is supported. Here,  $R^2$  is just 0.08. This implies not a very good model as independent variable explains only 8% of variance in dependent variable. Hypothesis 5 tested and table 2 detailed that followers' positive emotional reactions significantly and positively related to followers' attitudes ( $F=23.42$ ,  $R$  square= $14\%$ ,  $p < .01$ ,  $\beta = 0.37$ ) so hypothesis 5 also supported by results. Furthermore hypothesis 6 tested and result indicated that followers' negative emotional reactions negatively and significantly related to followers' job attitudes ( $F=13.45$ ,  $R$  square= $10\%$ ,  $p < .01$ ,  $\beta = -0.32$ ). So hypothesis 6 also supported.

**TABLE I: Mean, Standard Deviation and Correlation**

Variables	Mean	SD	1	2	3	4
1. Perceived Transformational Leadership	1.96	.36		0.328		0.812
2. Followers' Emotional Engagements	2.38	.326				0.287
3. Followers' Positive Emotional Reactions	1.79	.38		0.494		0.370
4. Followers' Negative Emotional Reactions	4.10	.37		-0.37		-.226
Job Attitude	1.95	.37				

Level of Significance: 0.01

**TABLE II: Linear Regression showing relationship among Perceived Transformational Leadership, Followers' positive & negative emotional reactions and Job Attitudes**

Independent variable	Dependent variables	
	Job Attitudes	Followers' Emotional Engagement
Perceived Transformational Leadership	F=17.91	F=17.79
	R <sup>2</sup> =0.72	R <sup>2</sup> =0.11
	P<.01	P<.01
	$\beta$ =.76	$\beta$ =.33
Followers' Positive Emotional Reactions	F=23.42	F=47.78
	R <sup>2</sup> =0.14	R <sup>2</sup> =0.24
	P<.01	P<.01
	$\beta$ =.37	$\beta$ =.49
Followers' Negative Emotional Reactions	F=13.45	F=23.73
	R <sup>2</sup> =0.10	R <sup>2</sup> =0.14
	P<.01	P<.01
	$\beta$ = -.32	$\beta$ =-.37

**Table III: Regression Analysis detailing relationship between Followers' emotional Engagement and job attitudes.**

Independent variable	Dependent variables
Followers' Emotional Engagement	Job Attitudes
	F=13.34
	R <sup>2</sup> =0.08
	P<.01
	$\beta$ =.29

## 5. Discussion

The basic aim to the study is to check the relationship among perceived transformational leadership, followers' emotional reactions, emotional engagement and followers' job attitudes. Results revealed that perceived transformational leadership significantly and positively related to followers' job attitudes and these results are supported by (Low et al., 1996; Kark, Shamir & Chen, 2003; Judge & Piccolo, 2004; Hakan *et al.*; Walumbwa, Avolia & Zhu, 2008; Al-Hussami, 2008; Jansen *et al.*, 2009 and Wang and Rode, 2010). Similarly research also proved that perceived transformational leadership also significantly and positively related to followers' emotional engagement and these finding supported by (Bass, 1985;; Kahn, 1990; Shamir *et al.*, 2003; 2005; Zhu *et al.*, 2009). These results provide a clear understanding and importance of transformational leadership style to engage the followers' emotional and to enhance their attitudes during work. Employees' perception regarding transformational leadership considered as milestone to enhance their productivity and satisfaction level which leads to achieve organizational goals and competitive advantages.

This study also found that followers' positive emotional reactions have significance and positive effect on followers' emotional engagement and their negative emotions also have negative and significance relationship with emotional engagement and these results also supported by previous studies i.e. (Bower, 1981; Hobfoll, 1989; Kahn, 1990; Meyer *et al.*. 1992; Fredricksons, 1998; Seo *et al.*2004). Results also indicated that employees' emotional engagement also has significant and positive relationship with followers' job attitudes. (Self, Vandenberg, & SEO, 1994; Rich *et al.*, 2010). This study proclaimed that followers' positive emotional reactions have significant and positive association with their job attitudes and these finding are supported by (Bower, 1981; Schwarts & Clore, 1983; Weis & Cropanzano, 1996; Kleef *et al.*2009). This study also provides insight understanding and role of emotions in leader & subordinate relationship. Emotions playing extensive role to make followers' satisfy and delight.

Conclusion is that perceived transformational leadership and followers' emotional reactions are playing an important role to enhance followers' emotional engagement and ultimately their job attitudes. Transformational leadership style is crucial to make employees emotionally loyal & satisfy. Organizations who want to maximize their employees' productivity and want to move their job attitudes positively with emotional engagement, they should

adopt transformational leadership style and organizations should introduce mechanism to care the employees' emotions.

### 5.1 Managerial Implications

Organizations need effective leadership with full of capabilities to motivate and satisfy its employees. Leadership style can play a vital role to make employees loyal, emotional engaged and satisfy. This study can help to organizations to understand the strategic role of transformational leadership to engage their employees emotional and move their attitudes toward positive directions.

### 5.2 Limitations and Future Directions

The study has theoretical input and practical implications; there are some limitations of this. Researchers can mitigate these limitations to create refined opportunities for further research. Results can be more accurate and reliable by increasing sampling frame. In this study sample size was small due to some financial and non-financial constraints. This study also ignored the characteristics of followers' which can influence their perception level regarding transformational leadership. Previous studies suggested that people are different in their abilities to recognize and perceive others. (Wong & Law, 2002; Rubin et al, 2005 and Joseph & Newman, 2010). So in future researchers can refine their research work by increasing the sample size and conducted research in other sectors as well. In future research followers' personal characteristics as a control variable and or as a moderator can also be in account to gain more accurate results regarding the perceived. In future researchers can also enhance accuracy by adding other ignored variables in their study.

## 6. References

- [1] Albion, M. J., & Gagliardi, R. E. (2007). A study of transformational leadership, organizational change and job satisfaction. In Proceedings of the 7th Industrial & Organizational Psychology Conference and 1st Asia Pacific Congress on Work and Organizational Psychology: Better Work. Better Organizations. Better World (pp. 1-5). Australian Psychological Society.
- [2] AL-Hussami, M. (2008). A study of nurses' job satisfaction: the relationship to organizational commitment, perceived organizational support, transactional leadership, transformational leadership, and level of education. *European Journal of Scientific Research*, 22(2), 286-295.
- [3] Antonakis, J., Avolio, B. J., & Sivasubramaniam, N. (2003). Context and leadership: An examination of the nine-factor full-range leadership theory using the Multifactor Leadership Questionnaire. *The leadership quarterly*, 14(3), 261-295.
- [4] Avolio, B. (1999). *Full leadership development: building the vital forces in organizations*, Sage Publications, Thousand Oaks, CA.
- [5] Avolio, B. J., & Bass, B. M. (1995). Individual consideration viewed at multiple levels of analysis: A multi-level framework for examining the diffusion of transformational leadership. *The Leadership Quarterly*, 6(2), 199-218.
- [6] Avolio, B. J. (1999). *Full leadership development: Building the vital forces in organizations*. Thousand Oaks, CA: Sage.
- [7] Avolio, B. J. (2005). *Leadership development in balance: Made/born*. Mahwah, NJ: Lawrence Erlbaum.
- [8] Bass, B. M., & Avolio, B. J. (1994). Shatter the glass ceiling: Women may make better managers. *Human resource management*, 33(4), 549-560.
- [9] Bass, B. M., & Avolio, B. J. (1995). *Multifactor leadership questionnaire (2nd ed.)*. Redwood City, CA: Mind Garden, Inc.
- [10] Bono, J. E., Foldes, H. J., Vinson, G., & Muros, J. P. (2007). Workplace emotions: The role of supervision and leadership. *Journal of Applied Psychology*, 92, 1357-1367.
- [11] Bono, J. E., & Judge, T. A. (2003). Self-concordance at work: Toward understanding the motivational effects of transformational leaders. *Academy of Management Journal*, 46(5), 554-571.
- [12] Bono, J. E., Foldes, H. J., Vinson, G., & Muros, J. P. (2007). Workplace emotions: The role of supervision and leadership. *Journal of Applied Psychology*, 92, 1357-1367.
- [13] Bower, G. H. (1981). Mood and memory. *American Psychologist*, 36, 129-148.
- [14] Burns, J. M. (1978). *Leadership*. New York: Harper and Row.

- [15] Collis, J., & Hussey, R. (2003). *Business research: A practical guide for undergraduate and post graduate students* Palgrave: Macmillan. New York. De Jong, J. P., & Den Hartog, D. N. (2007). How leaders influence employees' innovative behaviour. *European Journal of innovation management*, 10(1), 41-64.
- [16] Edwards, J. R., & Rothbard, N. P. (1999). Work and family stress and well-being: An examination of person-environment fit in the work and family domains. *Organizational behavior and human decision processes*, 77(2), 85-129. Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, 2, 300-319.
- [17] Gill, A. S., Flaschner, A. B., & Shacha, M. (2006). Mitigating stress and burnout by implementing transformational-leadership. *International Journal of Contemporary Hospitality Management*, 18(6), 469-481.
- [18] Hamidifar, F. (2009). A study of the relationship between leadership styles and employee job satisfaction at Islamic Azad University branches in Tehran, Iran. *AU-GSB- e-Journal*, 1-13.
- [19] Hemphill, J. K., & Coons, A. E. (1957). Development of the leader behavior description questionnaire. *Leader behavior: Its description and measurement*, 6, 38.
- [20] Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44, 513-524.
- [21] House, R. J. (1977). A 1976 theory of charismatic leadership. In J. G. Hunt & L. L. Larson (Eds.), *Leadership: The cutting edge* (pp. 189-207). Carbondale, IL: Southern Illinois University Press.
- [22] House, R. J., & Aditya, R. N. (1997). The social scientific study of leadership: Quo vadis?. *Journal of management*, 23(3), 409-473.
- [23] Iqbal Adnan (2009). Perceived Managerial Styles and their effects on organizational climate: The case of Pakistani Industry. *International review of business research papers*, Vol. 5(5), pp. 289-298.
- [24] Jansen, J., Vera, D., and Crossan, M., 2009. "Strategic leadership for exploration and exploitation: The moderating role of environmental dynamism", *The Leadership Quarterly*, Vol. 20, pp.5-18.
- [25] Joseph, D. L., & Newman, D. A. (2010). Emotional Intelligence: An Integrative Meta-Analysis and Cascading Model. *Journal of Applied Psychology*, 95, 54-78.
- [27] Judge, T. A., & Piccolo, R. F. (2004). Transformational and transactional leadership: A meta-analytic test of their relative validity. *Journal of Applied Psychology*, 89, 755-768. *Journal of Management*, 23, 409-473.
- [28] Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of management journal*, 33(4), 692-724.
- [29] Kark, R., Shamir, B., & Chen, G. (2003). The two faces of transformational leadership: empowerment and dependency. *Journal of applied psychology*, 88(2), 246.
- [30] Kark, R., Shamir, B., & Chen, G. (2003). The two faces of transformational leadership: empowerment and dependency. *Journal of applied psychology*, 88(2), 246.
- [31] Kuchler, W. J. (2008). Perceived leadership behavior and subordinates' job satisfaction in Midwestern NCAA division 3 athletic departments. *The Sport Journal*, 11(2).
- [32] Lado, A., Boyd, N., and Wright, P., 1992. "A competency-based model of sustainable competitive advantage: Towards a conceptual integration", *Journal of Management*, Vol. 18, pp.77-91.
- [33] Laohavichien, T., Fredendall, L., and Cantrell, R., 2009. "The effects of transformational and transactional leadership on quality improvement", *The Quality Management Journal*, Vol. 16, No. 2, pp. 7-24.
- [34] Lok, P., & Crawford, J. (2004). The effect of organisational culture and leadership style on job satisfaction and organisational commitment: A cross-national comparison. *Journal of Management Development*, 23(4), 321-338.
- [35] Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. (1996). Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *The Leadership Quarterly*, 7(3), 385-425.
- [36] Mael, F., & Ashforth, B. E. (1992). Alumni and their alma mater: A partial test of the reformulated model of organizational identification. *Journal of organizational Behavior*, 13(2), 103-123. Masood, S. A., Dani, S. S., Burns, N. D., & Backhouse, C. J. (2006). Transformational leadership and organizational culture: the situational strength perspective. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 220(6), 941-949.
- [37] May, D. R., Gilson, R. L., & Harter, L. M. (2004). The psychological conditions of meaningfulness, safety and availability and the engagement of the human spirit at work. *Journal of Occupational & Organizational Psychology*, 77, 11-37. Mayer, R. C., Davis, J.
- [38] H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, 20, 709-734.

- [39] McLaurin, J. R., & Al Amri, M. B. (2008). Developing an understanding of charismatic and transformational leadership. *Proceedings of the Academy of Organizational Culture, Communications and Conflict*, 13(2), 15.
- [40] Melum, M. (2002). Developing High Performance Leaders. *Quality Management in Healthcare*, 11(1), 55-68.
- Miles, S. J., & Mangold, G. (2002). The impact of team leader performance on team members' satisfaction: the subordinate's perspective. *Team Performance Management: An International Journal*, 8(5/6), 113-121.
- [41] Mosadeghrad, A.M. (2003). *Principles of Health Care Administration*. Tehran: Dibagran Tehran.
- Muthuveloo, R., & Rose, R. C. (2005). Typology of Organizational Commitment. *American Journal of Applied Science*, 2 (6), 1078-1081.

## E-LEARNING ROLE OF SOCIAL MEDIA IN EDUCATION

Caren Casama Orlanda-Ventayen<sup>1</sup>, Randy Joy Magno Ventayen<sup>2</sup>

<sup>1</sup>Masters Student, Pangasinan State University, Open University Systems

<sup>2</sup>Pangasinan State University, Lingayen Campus

### ABSTRACT

The born of the digital age opens the wide opportunity for users explore varied kinds of information and get connected through the use of Internet. The Internet provides rich resources of information and data that could be very vital for users whatever purpose they have either in business, work, education and for staying connected to the world trends. As it continuously grows, born of different kinds of websites such as web 2.0, could have the possible potential to improve the quality of instruction in education. Some basic feature of social media could have a great impact on the development of teaching learning process. Connectivity or interactivity offered by social media is an enormous attribute that attracts an audience to their websites. The key concept of sharing and posting in social media may serve as an instructor and facilitator of learning one's' topics are being posted, shared and worked out. Though these attributes, how does the internet or the social media being utilize to facilitate learning and to instruction? This study focus on the role of social media in education for teachers teaching in high school in Lingayen, Pangasinan. It sought to discover the use of social media in teaching by providing the profile of the teachers in Lingayen, Pangasinan.,the role of social media in education in different school activities and acceptability for the role and usage of social media in education.

**KEYWORDS:** Social Media, Learning, education

### 1. Introduction

In this millennial days, works become easier through the use of the internet. For it opens wide opportunities for the users in different field such as in business, career, work and other more depending on their desires and goals. The Internet could be storage of information, global education, online interactive or collaborative learning, improve the interest in learning, communication without boundaries, global education, electronic/online research, information catalogs and innovation in the new world(Park, 2009). Researcher search information and almost all needed will just appear on the screen. Since web 1.0 has evolved, the use of web 2.0 or social media is being emphasized. Social media is defined as “a group of Internet based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content” ( Kaplan & Haenlein, 2010, p. 61) According to Muntinga, Moorman and Smith, social media websites such as Facebook, YouTube, and Twitter provide unlimited means for internet users to interact, express, share and create content about anything. Now the question is, could this be used in the field of education? Social media is widely used as a tool for personal and business, the notion that social media could be used for education has received recent attention due to the widely used of the platform. It is also one of the major centers of research agenda. Based on researches conducted, there is potential for the platform to be used in education.

One feature of social media is connectivity. Once information is being posted and seen by another user, this serves as a source of spreading information speedily to numerous audience and regardless of time and place. Considering students, more often, especially in higher education, they find more pleasure using social media for it is not just source of information but also a bridge to communication. It is found out based on previous research the students use social media for personal but too rare for educational purposes (Hew, 2011) It's very pivotal to encourage students to use the internet or the social media for it also provides scientific information that is very useful in the field of education. Teacher's' role in education is not just to define or dictate ideas, to generate or to assign contents, but also to help every learner to construct learning paths to make them learn how to learn (metacognition) (Anderson & Dron, 2011).

#### 1.1 Statement of the Problem

This study investigated the role of social media in teaching specifically it sought to answer the following questions:

1. Profile of the teachers enrolled in PSU Open University Systems. 2. The role of social media in education in different school activities. 3. Acceptability for the Role and usage of social media in education.

## 1.2 Scope

This study will focus on the teacher having their master and doctorate degree enrolled in PSU OUS Lingayen, Pangasinan. It will answer the contribution of social media in education limited for the year 2017. The researcher limits the audience in particular respondents allowing them to be surveyed and informed for it concerns the development of instruction and educational system.

## 1.3 Importance of the Study

The importance of this study is to investigate the possible use of social media for the development of learning. This will also help us to understand the role of the platform for the motivation of learning for students. Some teachers myth not yet injecting or integrating social media in education. Whatever this research's outcomes, this can help to the development of teaching learning process. It can also contribute to the preparation of learning materials to be used in instruction to make learning be more creative and most of all students will learn and practice collaboration to make new ideas. It could also motivate teachers and make an interconnected connection to students whenever wherever and ever circumstances they have.

## 2. Review of Related Study

There are several studies conducted that explored the learning and teaching the role of social media. One is the qualitative research study of Joanne Gikas and Michael M. Grant (2011) entitled "Mobile computing devices in higher education: Student perspectives on learning with cell phones, smartphones & social media". They explored the teaching and learning when mobile computing devices, such as cellphones and smartphones, were implemented in higher education. They presented a portion of the findings on the perception of students using mobile computing devices and what could be the role of social media in education. Other research conducted by Nazan Dogruer, Ramadan Eyyamb and Ipek Menevisab in titled "The use of the internet for educational purposes". They focused on the use of internet in primary education. The speedily spreading of information through social medias could be very useful education. Rich source of information could be accessed on the internet may contribute a great factor to primary education.

In connection with Nazan Dogruer, Ramadan Eyyamb and Ipek Menevisab research, Park, H. W. (2009) investigated the role of the internet to college students in Korea. The conducted open ended survey online to some Korean university students. He used the word-frequency analysis and semantic mapping to monitor the use of the internet by the college students. Anticipated results would empower educators and policymakers to design and to plan e-learning programs for college students. If e-learning program is implemented in the Philippines, it would help students to catch up with previous topics. These researchers could have a great support to our community education. KK Esteves (2012) with the research title: Exploring Facebook to Enhance Learning and Student Engagement: A Case from the University of Philippines (UP) Open University. Researcher's study tends to study the potential of Facebook in education since the Philippine users are one of the most active users of Facebook. The study indicates how the distinctive components and functionalities of Facebook, for example, the wall, like, poke and the feature to share will reach media easily resulting in engagement of students to online learning. "Student engagement improved as evidenced by volunteered postings and continuous discussions and sharing even without being required by the professor". The study's most significant finding is Facebook's feature could be very useful for teaching practical skills posted online could efforts reach a vast number of users. These video tutorials posted online could be very vital to learning.

## 3. Research Methodology

In this study, the researcher adopted the quantitative method of research. The use of a survey for data collection has gained popularity over the years because of a great deal of valuable information on what people think about certain issues, products, policies, or events. This technique was used in the data collection in the present study. In addition, it is more common to use questionnaires because it yields information that is more systematic from all participants.

### 3.1 Sources of Data

The students of Pangasinan State University, Open University Systems for the SY 2016-2017 will be the sources of data for this study. Pangasinan State University, Open University System is one component of PSU that is offering Masters and Doctorate catering Pangasinan.

### 3.2 Data Processing

In conducting this study, a survey questionnaire was used. All students from Master of Arts in Education and Doctor of Education in the said school was invited to participate in the survey.

Participants were requested to be requested to complete the survey within 1 day period from the date of the issuance, the researcher used survey questionnaire as a tool for data gathering from the respondents. A set of instruments was prepared for the respondents. This questionnaire is consists of three parts. The first part was demographics of the respondents, which the researcher will get to know the respondents. The second part is the perception of respondents in the use of social media in education particularly the academic use and non-academic use. While the third part of the survey is about the usage and acceptability of social media. The survey questionnaire was float during the class of the doctoral students and master students. While Google forms were used to in floating questionnaire remotely. The gathered data was analyzed using the analytical software SPSS which automatically creates a graphical representation of the results.

## 4. Results

### 4.1 Profile of the Respondents

There are 55 invited respondents to participate while only 45 participated in conducting the survey. The respondents were dominated by 62.2% Female while 37.8% are male. The majority of the respondents with 68.9% are an education major, while others who are teaching in Senior High School possess other majors such as business, fisheries, math, social studies and others. Most of the respondents are government employees. For the level of teaching, 44.4% of the respondents are teaching High School/ Senior High school, 35.6% teaching elementary and 20% who are in tertiary or college level. For their respective work location, most of the respondents are from Dagupan having 20%, next is 15.6% from Binmaley, 11.1% are from Lingayen and the rest are from different municipalities of the province of Pangasinan.

### 4.2 Perception of Teachers in the Usefulness of Social Media Classroom

The result is divided into two perceptions; the first one is the perception of teachers in the usefulness of social media in academic usage. While the second one is the usefulness of social media in non-academic usage.

In the Figures 1 and 2 present that the use of social media in education is useful having 20.25 average, 15.12 for extremely useful, 7.5 for neutral. The majority of the respondents agreed that social media is useful in academic related activities. In the said figures, social media is much useful in an individual project, followed by assignment, collaborative learning, and discussion.

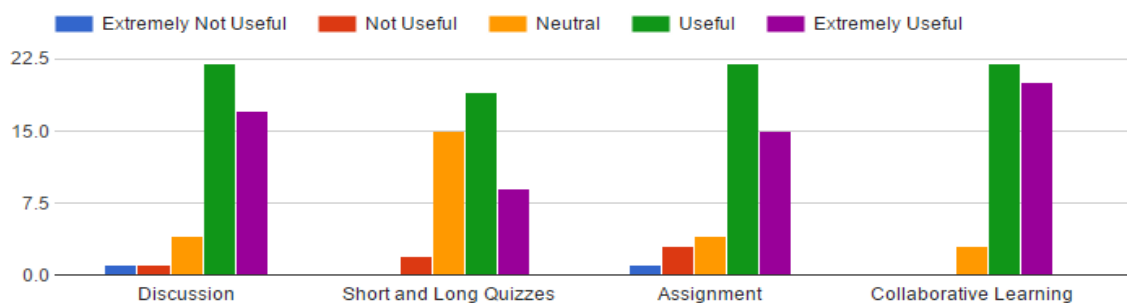


Fig.1. Academic Use of Social Media

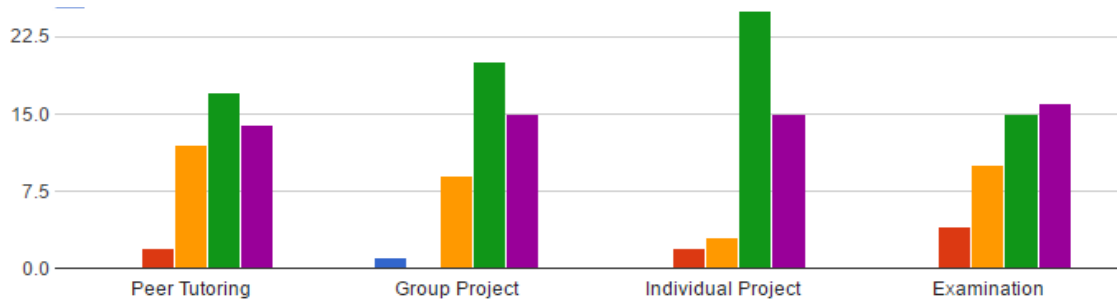


Fig.2. Academic Use of Social Media

For the perception of teachers in the use of social media for non-academic related activities. The majority agreed that social media is extremely useful in announcement and posting of the result.

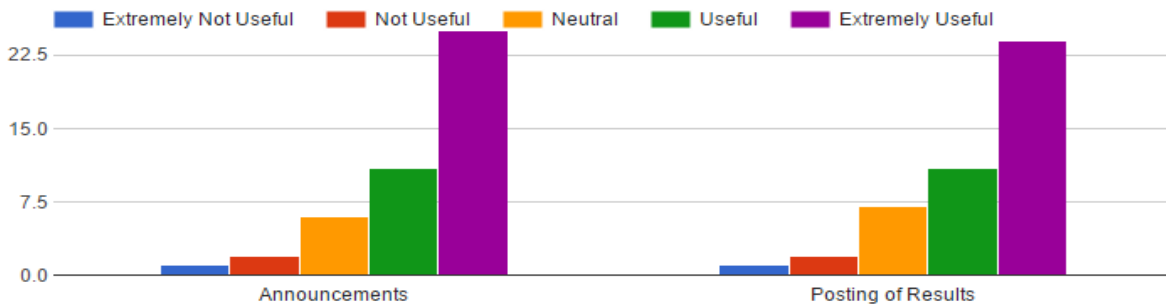


Fig.3. Non-Academic use of Social Media

### 4.3 Usage and Acceptability

All of the respondents are having their Facebook account garnering 100%, 2nd is google+ having 68.9% and 62.2% for Youtube. Facebook is most often used social media among the respondents. 77.8% of respondents have been using their social media account for more than five years, 13.3 percent for less than 3 to 5 years, 4.4% for less than 1 to 3 years and less than a year. 35.6% of the respondents using their accounts for 1 to 3 hours, 24.4% of respondents using their social media accounts for 3 to 5 hours and the other 24.4% for less than an hour.

Their main purpose of having an account is mainly for social networking having 88.9%, news update for 80% and 48.9% for video streaming and downloading.

97.8% use social media accounts for education-related activities. And the remaining percentage (sole respondent) is not using social media in education-related activities for it does not suite the respondent’s needs in education-related activities.

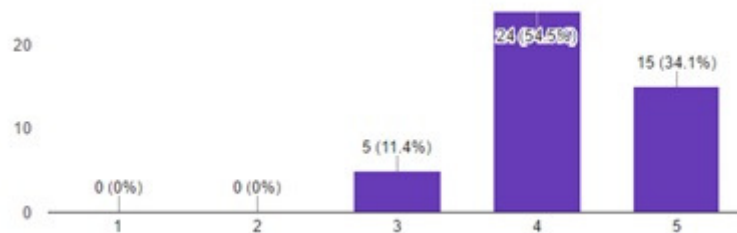


Fig.4 Social Media Account Used and Percentage of using Social Media in Education

Based on the total number of hours used in social media, 43.2% respondents use 26 to 50% of their total time spent in social media, while 36.4% use less than 25% of total time spent.

The respondents were asked on what educational purpose they use the social media. On the use of social media in education, 81.8% of the respondents use social media for downloading course material. Submission of reports and sharing files and documents tied with 79.5%. 77.3% use social media for educational purpose on getting updates and other class related activities. Lastly, 72.7% use social media for professional networking with other students and educators. The majority of the respondents use social media for the educational purpose.

The respondents were also asked what is the importance of social media in today's education. Most respondents agreed that social media "facilitate communication" and "builds connection" with a total of 86.4% for both importance. 81.8% of the respondents agreed that social media "allows more accessibility". 65.9% agreed that it helps or improve the process of preparing and submission of requirements, while 52.3% agrees that it facilitates blended approach to learning, and lastly only 50% agrees that it serves as an online platform for discussion.



.Fig 5: Level of Satisfaction on the use of Social Media

The respondents were also asked the disadvantages of social media in education, 81.8% agreed that it distracts the focus of students on doing school requirement, followed by 70.5% agrees that students may tend to become too dependent on the apps with regards to their school requirement. 65.9% responded that student may lose their ability to engage themselves in face to face communication and lastly 45.5% agrees that many bloggers and writers post wrong information on social media sites which might lead to confusion for the students. Figure 5 shows that 54.5 percent of respondents are satisfied with the use of social media in education. Lastly, 93.2% of the total respondents are facing low internet connectivity.

## 5. Conclusion and Recommendation

Based on the result, the researcher concluded that social media plays a vital role in education. Despite the disadvantages that social media provides a distraction to the students, there is still useful use of social media in education. The result of this study is impressive and social media could help students and teachers maximize the use of social networking. Instead of focusing on the disadvantage, the researcher also agreed with the respondents that there is an important search in the future.

## 6. Acknowledgement

The researchers would like to give thanks to our College Dean, Dr. Julie Lomibao for allowing the use of Google Classroom during the summer class, and to our supportive research coordinator for PSU Lingayen Campus, Dr. Nova Arquillano for the unconditional support to BSBA and BSHM researchers.

## 7. References

- [1] Brodahl, C., Hadjerrouit, S., & Hansen, N. K. (2011). Collaborative writing with web 2.0 technologies: education students' perceptions. *Journal of Information Technology Education*, 10, IIP73-IIP103.
- [2] Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. *AACE Journal*, 16(1), 21-46.
- [3] Tyack, D., & Cuban, L. (2000). Teaching by machine. *The Jossey-Bass Reader on Technology and Learning* (pp. 247-254). San Francisco, CA: Jossey-Bass. Kaplan & Haenlein, 2010, p. 61
- [4] JP Biddix, HW x- *New Media & Society*, 2008
- [5] Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. *The International Review of Research in Open and Distance Learning*, 12(3), 80-97.
- [6] Hew, K. F. (2011). Students' and teachers' use of Facebook. *Computers in Human Behavior*, 27(2), 662-676.



# SCHOOL-BASED IMPLEMENTATION OF PANTAWID PAMILYANG PILIPINO PROGRAM AND ITS SHORT-TERM EFFECTS IN A SELECTED SECONDARY SCHOOL

Kenichi Sasaki, Nelson T. Diaz, and Patrick Jann I. Brazal

## ABSTRACT

This paper investigated the short-term program effect of the Pantawid Pamilyang Pilipino Program (4Ps) recipients in terms of school attendance, academic performance and completion rate at the secondary school level. The 4Ps is a mechanism introduced in the Philippines to alleviate poverty by helping them through this conditional cash transfer. This program aims to improve the education and health condition of the recipients by giving them monthly allowances as they go to their daily classes. Majority of the recipients belongs to the lowest bracket of income earners or the poorest among the poor. The hope of this program is to reach all those poor family in order to help them improve their lives. The study involved monitoring the four-year performance of three batches of 4Ps recipients from 2013 until 2017 in a selected high school, Los Baños National High School. This school has a large number of 4Ps recipients in the province of Laguna, the Philippines. Based on the findings of this study, 4Ps recipients' academic performance and average attendance rate makes worse as they promote to higher grades. The percentage of retained/dropped 4Ps recipients in the first batch and the second batch was about 6%.

**KEYWORDS:** Academic performance, Conditional cash transfers, Pantawid Pamilyang Pilipino Program

## 1. Introduction

The government is doing its best to help the poorest families of the country. These families are being helped until they are able to provide for themselves and become independent from government support. One help given by government is the Pantawid Pamilyang Pilipino Program (4Ps) where cash cards are issued by the Department of Social Welfare and Development (DSWD) for the classified poor. The 4Ps is a conditional cash transfer (CCT) program of the Philippine government and a poverty reduction strategy that provides monthly allowance to the poorest of the poor to improve their health and education particularly of 0-18 year-old children. Under the 4Ps, the DSWD provides cash grants to beneficiaries consisting of P6,000 a year, or P500 per month, to households for health and nutrition expenses and P3,000 per school year or P300 a month for each child's educational expenses. A maximum of three children per household is allowed. It was started by then President Gloria Macapagal-Arroyo in 2008 and continued in massive scale during the Aquino Administration. Its total budget from 2011 to 2016 was P295 billion for a total of 4.4 million beneficiaries. To implement it, the Asian Development Bank granted \$400 million and the World Bank, \$450 million, raising the Philippine government's indebtedness to the two multilateral financial institutions to \$1.8 billion. This paper investigated the short-term program effect of the 4Ps recipients in terms of school attendance, academic performance and completion rate at the secondary school level through monitoring and interviewing.

## 2. Related Literature

### 2.1 Foreign Literature

In a study Conditional Cash Transfer in Education: Design Features, Peer and Sibling Effects Evidence from a Randomized Experiment in Colombia (Felipe Barrera-Osorio et.al 2008). The Program de Ampliacion de Cobertura de la Educacion Secunderia (PACES) a conditional cash transfer program for secondary schools, it was found out that on average, the incentives increase attendance, pass rates, enrollment, graduation rates, and matriculation to tertiary institutions. It also demonstrates that the design of educational incentive programs matter and that experiments can be used to understand how variation in the structure of the program may affect educational and related outcomes for targeted children and their families.

Another study entitled Impacts of CCT Programs on Educational Outcomes in Developing Countries: A Meta-

analysis by Juan Esteban Saavedra and Sandra Garcia (2012). It was found out that CCT programs appear to be more effective for secondary than for private schooling. Relative to baseline enrollment, the average effect size for secondary enrollment is ten percent, while for primary it is six percent relative to baseline enrollment. For attendance outcomes, the difference is even more drastic. Relative to baseline attendance, the average effect size in primary is about three percent while for secondary is close to twelve percent. CCTs also reduced dropout rates by twice as much in secondary that in primary schooling. It was also found out that it also affects sizes for all outcomes (enrollment, attendance and dropout) in all levels (primary and secondary) exhibit high degree of heterogeneity.

Most of the heterogeneity stems from variation in effect estimates across programs rather across references of the same program. It was concluded conclude that CCT programs are more effective in contexts in which initial enrollment and attendance conditions are relatively poor and for that reason, particularly effective in improving secondary schooling outcomes. When offered to primary school students, offering a more generous transfer amount and coupling transfers with additional resources such as infrastructure, textbook or teachers is associated with larger program effects. The relative effectiveness of CCTs for secondary schooling outcomes and additional costs related to transfer generosity and supply-side resources suggest that under tight budgetary conditions, targeting CCT investments to secondary level pupils is one simple way improve program cost effectiveness.

## 2.2 Local Literature

In a study on the impact of 4P's in Tagbina II District by Kirk Andrew Abellanosa (2009) The Pantawid Pamilyang Pilipino Program is no doubt plays a significant role in reenergizing the Philippine educational System. Since its implementation in 2008, the enrolment and daily attendance had increased prior the implementation of the program. The data shows that the drop-out rate had decreased from 3.52% in S.Y 2006-2007 to 0.76% in S.Y 2009-2010 to 0.52% in S.Y 2012-2013. The data also shows an increased-on promotion rate from 91.76% in S.Y 2006-2007 to 95.28% in S.Y 2009-2010 to 96.43% in S.Y 2012-2013. In another study by Rosario G. Manasan, a before-and-after comparison of the growth rate of school enrollment provides some early indication of the program's success in improving school attendance. However, the approach used in this initial look at the effect of the 4Ps on school attendance is not as rigorous as other impact evaluation techniques.

A study entitled Pantawid Pamilyang Pilipino Program (4Ps): Assistance to Pupil's Education by Monica M. Montilla et al. 2015, revealed that because of 4p's, pupils are able to attend classes and they are motivated to go to school every day. The study also reveals that their parents/guardian are able to pay their school contributions and their parents/guardian are able to provide their school requirements (projects, school supplies, allowance, etc.) Findings also revealed that 4P's beneficiaries are attending classes regularly. 4Ps gives Php 300/month as support for the education of pupils from 3-4 years, thus as a condition, a child enrolled in elementary school must maintain class attendance rate at least 85% per month (4Ps DSWD, 2006) and as expected by schools they can pay their contribution and provide school requirements (projects, school supplies, allowance, etc.).

However, a research entitled Promoting Inclusive Growth through the 4Ps by Celia M. Reyes et al. stresses that although the 4P's program leads to an increase in the school participation, the current coverage by 4P's of children 6-14 years old is intended the child to finish elementary. However, before the age coverage was not expanded from 15-18 years old, the maximum five years of support may mean that a child who was six years old at the time the family first received the benefit may only complete grade 5. Thus, for the very poor who rely solely on the assistance from 4P's to send their children to school, their children may not finish elementary school.

## 3. Methodology

The authors focused the 4Ps recipients on a secondary school, Los Baños National High School. There are 440 recipients at this school in August 2017. In order to remain a beneficiary of the 4Ps program, household-recipients need to comply with their co-responsibilities which are 85 percent school attendance. To employ 4P's program at school based level, the Municipal Social Welfare Development (MSWD) provides the list of 4Ps recipients to the school every year firstly. And then, the Guidance Office checks the list to identify the recipients who are enrolled in the school. During the opening of school year, there is a general assembly of parents of the students' recipient together with the school's administration and the MSWD representatives. Monitoring of recipient's daily attendance is always checked by classroom advisers. The recipients who failed to comply with the required percentage of school attendance is reported to the MSWD by presenting the certified checklist. Constant coordination among the teachers, parents and MSWD is being practiced to track the recipients' school attendance.

Table I shows us that the respondents of this study are the 4Ps recipients in Grade 8, 9, and 10.

TABLE I: NUMBER OF SAMPLE 4PS RECIPIENTS FROM LOS BAÑOS NATIONAL HIGH SCHOOL

School Year	Grade 7	Grade 8	Grade 9	Grade 10
2013-2014	87 (1 <sup>st</sup> batch)			
2014-2015	69 (2 <sup>nd</sup> batch)	87 (1 <sup>st</sup> batch)		
2015-2016	66 (3 <sup>rd</sup> batch)	69 (2 <sup>nd</sup> batch)	87 (1 <sup>st</sup> batch)	
2016-2017		66 (3 <sup>rd</sup> batch)	69 (2 <sup>nd</sup> batch)	87 (1 <sup>st</sup> batch)

#### 4. Summary of Findings

Based on the data presented for the study on the short-term effect of 4Ps in terms of attendance rate, academic performance, promotion and completion rate in this high school here are the findings: For the first batch of 4P's recipients, there are 32 males and 55 females with a total of 87. Of these, 59 were 15 years old, 23 were 16 years old, 3 were 17 years old and 2 were 18 years old. For the first batch, the average academic performance was 82.63% in Grade 7 (SY2013-2014), slightly increasing to 83.52% in Grade 8(SY2014-2015), but decreased by 0.52% to 83% in Grade 9(SY2015-2016). There was a further 1% decrease to 82% at Grade 10(SY2016-2017). In the case of average attendance, data shows a gradual decrease from 97% in Grade 7 and 8, then 94% in Grade 9 and 92% in Grade 10. From this batch, 6% of them did not complete Grade 10. The completion rate was only 94%.

For the second batch of 4P's recipients, there are 30 males and 39 females with a total of 69. Of them, 7 were 14 years old, 41 were 15 years old, 13 were 16 years old, 6 were 17 years old and 2 were 18 years old. For the second batch, the average academic performance was 82.17% in Grade 7 (SY2014-2015), decreasing to 81.65% in Grade 8(SY2015-2016), and continuously decreased by 0.65% to 81% in Grade 9 (SY2016- 2017). In the case of average attendance, data shows a gradual decrease from 98% in Grade 7, then 92% in Grade 8 and 89% in Grade 9. From this batch, 6% of them did not complete Grade 9. The proportional rate was 94%.

For the third batch of 4P's recipients, there are 31 males and 35 females with a total of 66. Of these, 9 were 13 years old, 38 were 14 years old, 9 were 15 years old, 6 were 16 years old and 3 were 17 years old, while one student has no birth date record during the conduct of this study. Their average academic performance for SY 2015-2016 was 82.58% with an increase of 0.33%, or 82.91% at Grade 8. However, their average attendance decreased from 94% to 90% at Grade 7 and Grade 8, respectively. Despite this, all students were promoted from Grade 7 to Grade 8.

#### 5. Narrative Report

The authors reviewed the data of 4P's student recipients of Los Baños National High School during the 2016-2017 academic school years to identify the students who have significant record of truancy. They, then coordinated with Grade 10 chief advisers and Guidance counselor to locate the (present) sections of the student recipients who were identified as truant. In this article, the term "subject" is used with the student gender and number according to the database/list (ex. Subject M#1) to assure confidentiality. Once their sections were identified, the authors met with the subjects and had them answer a survey form and some probing questions based on the subjects' responses. The subjects were asked on the reasons why they were not attending school regularly. The following are subjects of the background information.

Subject M#4 lived with his father, mother and 4 siblings. His father is a part-time carpenter and her mother a street vendor. Subject M#4 has 83% attendance rate, he was not able to attend school regularly last year because his father was out of work. He also said that sometimes he skipped school for no apparent reason.

Subject M#5 resided with his parents and 4 siblings, only his father earn in the family as a part-time carpenter. His attendance rate is 82%, he admitted that he has no interest in studying and prefer to cut classes or skip school with his friends.

Subject M#29 lived with his parents and 4 siblings. His father is a jeepney driver. Illness and lack of motivation to attend school was the reason for his 82% attendance rate.

Subject F#11 lived with her parents and 3 siblings. Her father is a construction worker. Her 88% was due to frequent colds and flu.

Subject F#15 lived with her parents and 1 sibling in Brgy. Bagong Silang, the farthest and most inaccessible barangay in Los Baños. Her father is a farmer. Surprisingly, her attendance rate is higher compared to other subjects at 90%. Her 20 absences was due to sickness and episodes of dysmenorrhea.

Subject F#26 lived with her parents and 1 sibling. Her father works as a construction worker in a small construction firm. The reason for her 86% attendance rate was when she attended her sick younger sibling who was confined in a hospital while her mother was processing the requirements for availing PhilHealth subsidy.

Subject F#34 lived with her mother and 2 siblings. She was not able to meet or know her father since birth. Her mother's relatives help support her education. She said, the reason for her absences last year was due to the infection of a boil behind her ears.

Subject M#101 is 16 years old. He has gone to school last January 2017, he was retained as grade 9 and decided to enroll last June 2017. There are 8 siblings on his family and he is the 4th child. His father works as a tricycle driver and his mother is working as a part time dish washer in one of the resort in Los Baños. According to him, he is not attending classes because he got hooked in computer games and sometimes he need to attend his younger siblings.

Subject M#102 is 17 years old. He was retained as grade 10 because he failed in 2016. He is currently enrolled this school year. He is the youngest of 5 siblings in the family. His father work as a pedicab driver and his mother is a vendor. He failed to attend his classes before due to lack of money for his school expenses. Now, he is attending his class regularly. He wants to finish and have a college degree in the future.

Subject M#103 is 17 years old. He failed his 3 subjects; English, Mathematics and Science last 2016. He is the second child of 5 siblings in the family. His father work as a construction worker and his mother is a housewife. His 3 siblings are also studying. During weekends, he works in a water refilling station as a delivery boy. Currently, he is enrolled but sometimes, failed to attend his classes due to financial problem. He dreams of becoming a seaman someday.

Subject F#104 is 16 years old. She was retained at grade 9 due to absences causes her to failed most of her subject. She is the second child of 8 siblings. Her father works as construction worker and her mother is a house wife. Right now, she has a live-in partner. She said, lack of money resulted her absences during her school days. But she still wants to go back to school to finish her study.

Subject M#105 is 15 years old. He was retained as grade 9 in 2016. He was enrolled last June but has gone to school since July 2017. He is the eldest of 2 siblings. He is a product of broken family. His mother decided to work abroad to support them. The reasons why he failed to attend classes is he spend most of his time playing basketball. He wants to become a professional basketball player someday.

During the interview, subject F#106 is in Quezon Province to attend an important family occasion. His uncle accepted us for the interview. She is the second child of 3 siblings. Her father is prisoner so her mother is the one who work as vendor to support them. She was a retained student in grade 10. She was retained in 2016 because she failed most of her subject due to school absences. According to her uncle, lack of money leads subject F#106 to be absent from her class. She is now enrolled to other school and during weekend, she helps her mother selling "kakanin".

During interview, subject M#107 is working with his father as construction worker in Manila. He has gone to school since August 2016. He was retained as grade 10. He is the fifth child of 7 siblings. His mother is a caretaker of a fishpond. During his school days, he walks 3 kilometers going to the highway before riding a jeepney to Los Baños. He lives in Hanggan Calauan Laguna. There is no electricity in his house. According to his mother, he decided not to go to school this year to work and help his parents to support the education of his other siblings. He wanted to

finish his study and find a stable job someday according to his mother.

## 6. Conclusion

Based on the findings of this study, conclusions were drawn.

1. All batches of the 4Ps recipients' academic performance and average attendance rate worsen as they promote to higher grades.
2. The percentage of retained/dropped 4Ps recipients in the first batch and the second batch was about 6% while the third batch attained 100% of promotion rate.
3. According to some 4Ps recipients about their declining of school attendance, the allowance that they receive is not enough to support their school expenses. Instead of going to school, they try to find ways on how they can get money to spend to attend their class and make for their living. Therefore, the attendance rate decreased, but still they meet the minimum required attendance.

In an article on ABS-CBN NEWS (Bosano, R. 2017), Former Chairman of the House Committee on Poverty Alleviation Emmi De Jesus submitted House Resolution 464 which aims to re-evaluate the implementation of the 4Ps Program. "It can only address hunger. You can ask all the beneficiaries about this. For sure, they will all say that what they need are jobs," De Jesus said. For De Jesus, it will be better if the DSWD channel their funds to other things that would help the poor. "Funds for social services should be increased or housing for the poor," according to De Jesus.

## 7. Acknowledgment

This work was supported by JSPS KAKENHI Grant Number JP16K04524. Manuscript received Aug. 30, 2017. Kenichi Sasaki is with Hokka Hokkaido University of Education, Asahikawa Campus, JAPAN. Nelson T. Diaz and Patrick Jann I. Brazal are with Los Baños National High School, Philippine.

## 8. References

- [1] J.E. Saavedra, and S. Garcia, "Impacts of Conditional Cash Transfer Programs on Educational Outcomes in Developing Countries- A Meta-analysis," *RAND Center for the Study of Aging (P30AG012815) and the NICHD funded RAND Population Research Center (R24HD050906). WR-921-1 February 2012*
- [2] J. Baez, and A. Camacho, "Assessing the Long-term Effects of Conditional Cash Transfers on Human Capital: Evidence from Colombia.," *I Policy Research Working Paper 5681. The World Bank, Jun 2011.*
- [3] T. Barham, K. Macours, and J. A. Maluccio, "Long-Term Effects of a Conditional Cash Transfer Program in Nicaragua," *J-PAL*
- [4] M.I.P. Conchida, and M. Tiongco, "Optimal Allocation of School and Health Resources for Effective Delivery of the Conditional Cash Transfer Program in Bagac, Bataan," *DLSU Research Congress, De La Salle University, Manila, Philippines March 6, 2014*
- [5] R. G. Manasan, "Governance and Urban Development: Case Study of Metro Manila," *Discussion Paper Series No. 99-06 2012.*
- [6] M.M. Monica, E.A. Delavin, J. R. Villanueva and, R.A. Turco, "Pantawid Pamilyang Pilipino Program (4P's) Assistance to Pupil's Education," *Asia Pacific Journal of Education, arts and sciences, Vol.2 No.3, July 2015*
- [7] F. Barrera-Osorio, M. Bertrand, L. L. Linden, F. Perez-Calle, "Conditional Cash Transfers in Education. Design Features, Peers and Siblings Effects evidence from a Randomized Experiment in Colombia," *NBER Working Paper No. 13890, Issued in March 2008*
- [8] C.M Reyes, A.D. Tabuga, C. D. Mina, and A.D Romina, "Promoting Inclusive Growths through 4P's," *PIDS Research Paper Series No. 2013-09, Philippine Institute for Development Studies January 2012.*
- [9] Abellanos, Kirk Andrew, "The Impact of 4P's in Tagbina II District," *Published in Government and Non-Profit Slide Share December 14, 2014*
- [10] R. Bosano. (August 2017). 4Ps, Nais Pag-Aralan ng Ilang Mambabatas. *ABS-CBN NEWS*  
Available: <http://news.abs-cbn.com/news/08/11/17/4ps-nais-pag-aralan-ng-ilang-mambabatas> 2/9
- [11] B. Quejada (January 2013). 'Pantawid' Palalawakin sa Buong Cavite - Rep. Ayong.  
Available: <http://www.philstar.com/bansa/2013/01/12/895872/pantawid-palalawakin-sa-buong-cavite-rep.-ayong> 1/



## EFFECT OF PRIMING ON PHYSIOLOGICAL AND CHROMOSOMAL CHANGES OF AGED SOYBEAN SEEDS

**Phyu Sin Thant<sup>1</sup>, Adam B Puteh<sup>1</sup>, Uma Rani Sinniah<sup>1</sup>, Mohd Firdaus Bin Ismail<sup>1</sup>**

<sup>1</sup>Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor D.E., Malaysia

### ABSTRACT

Soybean seed ageing during storage is one of the major causes of seed deterioration. Seed priming is an effective technique to improve seed quality of various crops. This study was undertaken to examine changes in mechanisms involved in stored seeds following priming. The seeds of vegetative soybean cultivar AGS-190 were harvested at harvest maturity and stored at room temperature (25°C). The seeds stored for 6, 9 and 12 months were primed with water, 0.5% chitosan or -0.8MPa PEG. The results indicated that prolonged storage of the seeds under room temperature reduced seed germination performance. The activities of catalase (CAT) and superoxide dismutase (SOD) decreased and accumulation of malondialdehyde (MDA) content and chromosomal damage increased with longer storage period. Seed priming with -0.8MPa PEG improved the quality of 6 months stored seeds resulting in better germination percentage and germination index. Increase in SOD, CAT activities and decrease in the content of MDA and chromosomal aberrations were observed when 6 months stored seeds were primed with -0.8MPa PEG. The study indicates that loss of seed germination during storage is related to failure of CAT and SOD enzymes to protect reactive oxygen species (ROS) attack which resulted in auto-oxidation of lipid and nucleic acid. The results here also suggest that improvement of stored seed quality following priming is associated with reduction of lipid peroxidation and genetic damage through increase stimulation of antioxidants enzyme systems.

**KEYWORDS: seed aging, storage, priming, seed quality, antioxidant enzymes, lipid peroxidation, chromosomal aberration**

### 1. Introduction

Seed ageing during storage is one of the basic reasons for low productivity in soybean (Shelar et al., 2008). Seed ageing process in soybean is accelerated by storage conditions such as high temperature and high relative humidity, moisture content of seeds, storage period, and initial quality of seeds (Bewley et al., 2013). Seed deterioration is associated with biochemical and metabolic changes including increase lipid peroxidation and decrease in antioxidant enzyme activities such as catalase (CAT), peroxidase (POD) and superoxide dismutase (SOD) during ageing (Chen et al., 2013; Xin et al., 2014; Xia et al., 2015). On the other hand, loss in viability during seed storage is related to an increase in chromosomal aberrations in the seeds (Rao et al., 1987).

Seed priming is well known effective technique to improve seed quality and seedling establishment in a wide range of crops. It is a presowing seed treatment with natural or synthetic compounds before germination (Jisha et al., 2012). The beneficial effects of priming on the germination performance include induction of biochemical mechanisms such as the resumption of metabolic activity to restore cellular integrity through the synthesis of nucleic acids, proteins and the improvement of the antioxidant defense system (Bewley and Black, 1994). Seed priming enhances defensive antioxidant enzyme systems in aged seeds and consequently reduces cell membrane damage caused by accumulation of ROS (Siri et al., 2013). Improvement of seed viability in aged seeds following priming is related to reduction of chromosomal aberration (Sivritepe and Dourado, 1995).

It is needed to know how seed deterioration mechanisms such as seed germination process, defensive antioxidant enzymes, lipid peroxidation and genetic damage can be changed by priming. Therefore, this study was proposed to examine changes in mechanisms involved in storage seeds following priming.

## 2. Materials and Methods

### 2.1. Seed Material and Priming

This experiment was conducted at Seed Technology laboratory, Department of Crop Science, Faculty of Agriculture, UPM. The seeds of vegetative soybean cultivar AGS-190 were harvested at harvest maturity and stored at room temperature (25°C) for 6, 9 and 12 months. Stored seeds were primed with water, 0.5% chitosan and -0.8MPa PEG (8000). Dry seeds were used as an unprimed control and water was used a primed control.

### 2.2. Germination Performance

Standard germination test of aged seeds was done according procedure described by ISTA (2006). A total of 50 seeds from each priming treatment were germinated in the box (300 × 230 × 100 mm) containing oven dried sterilized sand media at 25°C. Seedlings were evaluated and counted daily for seven consecutive days. Standard germination was recorded based on three replications. Germination index was calculated as described by (Zhang et al., 2007) using the formula: Germination index (GI) =  $\sum (Gt/Tt)$  where Gt is the number of germinated seeds on day t, Tt is time corresponding to Gt in days.

### 2.3. Antioxidant Enzyme Activities

Three samples per replicate were prepared for all priming treatments applied at 6, 9 and 12 months storage period to measure antioxidant enzyme activities. The activity of CAT was detected as described by Aebi (1984) using spectrophotometer. The 3 mL reaction mixture contained 1.5mL 50 mM potassium phosphate buffer (pH 7), 0.5mL 75 mM H<sub>2</sub>O<sub>2</sub>, 0.05mL extracted enzyme and distilled water. The mixture without enzyme extract was used as a blank. Catalase activity was detected in absorbance at 240 nm for two minutes. SOD activity was measured according to the method of Gupta *et al.* (1993). The reaction mixture contained 0.1mL 200mM methionine, 0.01mL 2.25mM nitro blue tetrazolium (NBT), 0.1 mL 3 mM EDTA, 1.5 mL 100mM potassium phosphate buffer, 1mL distilled water, 0.1 mL 60 μM riboflavin and 0.05 mL enzyme extract. Absorbance was recorded at 560 nm by measuring decrease in absorbance of superoxide nitro blue tetrazolium complex by the enzyme.

### 2.4. Lipid Peroxidation (MDA assay)

The level of lipid peroxidation was determined as malondialdehyde (MDA) content by the method described by Stewart and Bewley (1980) with a little modification. Three samples per replicate were prepared for all priming treatments applied at 6, 9 and 12 months storage period. A total of 3 mL reaction mixture contained 1mL extracted sample and 2 mL 0.5% thiobarbituric acid (TBA) in 20% trichloroacetic acid solution. MDA was detected at 450, 532 and 600 nm.

### 2.5. Chromosomal Aberrations

The chromosomal aberration was detected at anaphase of mitotic cell division in 6, 9 and 12 months aged seeds following priming according to the procedure of Sivritepe (1992). The 10mm of 3-4 day-old seedling were fixed with (1:3) glacial acetic acid: absolute alcohol mixture for 24 hours in the refrigerator. After fixation, the radicles are washed with distilled water and hydrolyzed with 1M HCl in a water bath at 60 °C for 10 minutes. The radicles were placed in a Petri dish and one drop of 1% aceto-carmin stain was added. They were then warmed on a hot plate at 50-60°C before transfer to a glass slide and the 0.8-1.0 mm from the radicle-tip was excised for examination. One drop of 1% aceto-carmin was added and radicle-tip squashes were made. Each slide was covered with a cover slip and examined under the light microscope with high power magnification.

### 2.6. Data Analysis

The data were subjected to ANOVA using Statistical Analysis System software, version 9.4. The least significant differences (LSD) test was applied at P<0.05 to compare the means between different priming treatments at different storage periods.

### 3. Results and Discussion

#### 3.1 Germination Performance

The results showed that seed germination percentage and germination index performed very well in the seeds stored for 6 months in comparison with stored seed for 9 and 12 months (Table 1). When seed priming was applied on 6 months stored seeds, the highest germination percentage of 82.67% was recorded in -0.8MPa PEG. Germination index was also improved when primed with -0.8MPa PEG and 0.5% chitosan. The improvements of PEG primed seeds may be quantitative changes in biochemical content of the seeds and improved membrane integrity and enhanced physiological activities at seed germination (Sung and Chang, 1993).

TABLE I. Germination Percentage and Germination Index of AGS-190 as affected by Storage Period and Priming Treatments

Storage Period (month)	Priming	Germination %	Germination Index
6	Control	75.33b	33.46b
	Water	69.33c	26.81b
	0.5% chitosan	76.67b	42.28a
	-0.8Mpa PEG	82.67a	46.47a
9	Control	62.00ab	24.52a
	Water	42.00c	13.01b
	0.5% chitosan	53.33b	23.28a
	-0.8Mpa PEG	64.67a	26.26a
12	Control	44.00a	18.19a
	Water	42.00a	16.51a
	0.5% chitosan	40.67a	15.20a
	-0.8Mpa PEG	46.00a	16.44a

Means followed by same letters are not significantly different ( $P \leq 0.05$ , LSD Test).

#### 3.2 Antioxidant Enzyme Activities

Prolonged storage of soybean seeds under room temperature (25 °C) reduced CAT and SOD activities (Figure 1-A, B). Seed priming increased CAT and SOD activities of AGS-190 especially in the seeds stored for 6 months. It was visible that higher CAT and SOD activities were obtained when six months old seeds were primed with water, 0.5% chitosan and -0.8MPa PEG. Furthermore, priming with -0.8MPa PEG improved both CAT and SOD activities of 9 months stored seeds. For 12 months storage, slightly higher activities in CAT were observed in water and chitosan primed seeds. However, all the priming treatments exhibited lower SOD activities in 12 months stored seeds than control. It indicated that seed priming allows the initiation of enzymatic antioxidant systems such as SOD, CAT in responsible to ROS accumulation during seed ageing. Involvement of antioxidant enzyme in seed recovery has been reported in sunflower in which osmopriming with PEG induce the synthesis of catalase which play a key role in protection and repair systems during ageing (Kinbiza et al., 2011).

#### 3.3 Lipid Peroxidation

As a symptom of lipid peroxidation, MDA content in control seeds of AGS-190 linearly increased with longer storage period (Figure 1-C). Seed priming with -0.8MPa reduced the content of MDA in 6 months stored seeds although priming with water and 0.5% chitosan exhibited almost the same level of MDA to unprimed aged seeds. It was clearly seen that osmopriming also decreased the MDA content in 9 and 12 months stored seeds. Lower level of MDA in primed seeds suggested that osmopriming improved seed deterioration by repairing cell membrane indicating reduction of lipid peroxidation with increased rate of antioxidant system synthesis responsible for eliminating ROS from the cells. Chen and Arora (2011) also reported that MDA accumulation was reduced during osmopriming.

### 3.4 Chromosomal Aberrations

Seed ageing increased genetic damage indicating that chromosomal damage increased 6% in 9 months and 8% in 12 months stored AGS-190 seeds compared to control (Figure 1-D). Seed priming reduced genetic damage and it was clearly seen in 9 and 12 months stored seeds. Priming with water and -0.8MPa PEG showed lower accumulation of chromosomal damage in seeds stored for 6 months. Lower accumulation of chromosomal aberrations in primed seeds indicated seed priming can repair genetic damage of aged seeds. Improvement of seed quality could be because of completion of DNA repair during priming (Osborne, 1983) and consequent activation of many enzymatic processes (Moosavi et al., 2009).

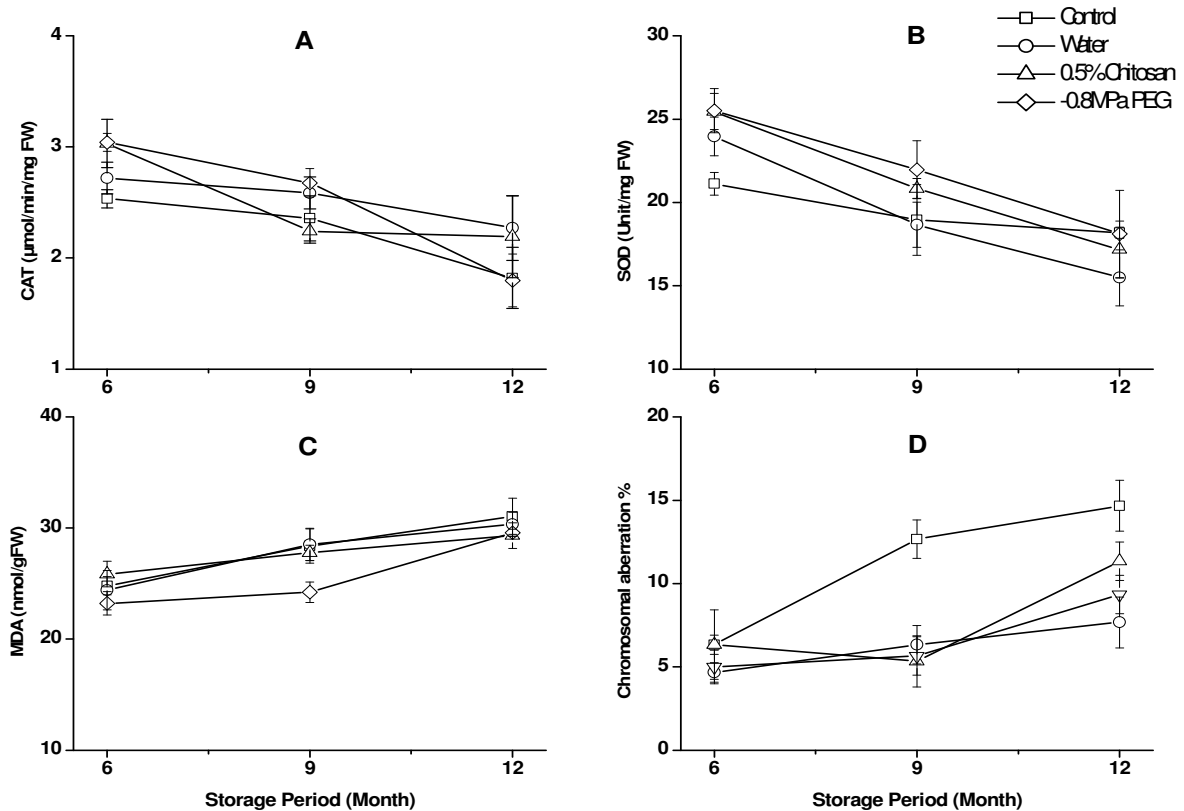


Fig. 1: Changes in CAT(A), SOD (B), MDA (C) and chromosomal aberration (D) of AGS-190 as affected by storage period and priming.

The seeds stored in room temperature after 6, 9 and 12 months were primed with water, 0.5% chitosan and -0.8MPa PEG. Dry seeds were used as control. The vertical bars above mean represent standard error.

## 4. Conclusion

It is recommended that priming with -0.8MPa PEG should be applied to enhance seed quality soybean stored for less than one year. The results here indicate that lipid peroxidation occurred in stored seeds were reduced with sufficient amount of antioxidant enzymes promoted by priming. Reduction of genetic damage in stored seeds might be associated with stimulation of enzymatic and non-enzymatic antioxidants during priming. The study suggests that priming improves the activities of antioxidant enzymes by repairing the cell membrane and genetic damage occurring during storage.

## 5. Acknowledgement

The authors express the appreciation to Universiti Putra Malaysia for giving Phyu Sin Thant the opportunity to work on this research project. Financial support by Organization of Women Scientists for Developing World (OWSD) to conduct this research at Universiti Putra Malaysia is truly grateful.

## 6. References

- [1] H. Aebi. 1984. Catalase in vitro. *Methods of Enzymol.*, 105. pp. 21-126.
- [2] J. D. Bewley, K. J. Bradford, H. W. M. Hilhorst, and H. Nonogaki. 2013. *Seeds: Physiology of development, germination and dormancy*, 3rd ed. *Seed Sci. Res.*, 23. pp. 289.
- [3] J. D. Bewley, and M. Black, "Seeds", in *physiology of development and germination*, 2nd ed., New York, USA: Plenum Press, 1994, pp. 167-171.
- [4] H. Chen, D. Osuna, L. Colville, O. Lorenzo, K. Graeber, H. Kuester, ... and I. Kranner. 2013. Transcriptome-wide mapping of pea seed ageing reveals a pivotal role for genes related to oxidative stress and programmed cell death. *PLoS One*, 8(10). pp. e78471. <https://doi.org/10.1371/journal.pone.0078471>
- [5] K. Chen, and R. Arora. 2011. Dynamics of the antioxidant system during seed osmopriming, post-priming germination, and seedling establishment in Spinach (*Spinacia oleracea*). *Plant Sci.*, 180. pp. 212-220.
- [6] A.S. Gupta, R. P., Webb, A. S. Holaday, and R. D. Allen. 1993. Overexpression of superoxide dismutase protects plants from oxidative stress (induction of ascorbate peroxidase in superoxide dismutase-overexpressing plants). *Plant Physiol.*, 103(4). pp. 1067-1073.
- [7] ISTA. 1999. International rules for seed testing. *Seed Sci. Technol.*, 27. pp. 340.
- [8] ISTA. 2006. International rules for seed testing, International Seed Testing Association, Bassersdorf, Switzerland.
- [9] K. C. Jisha, K. Vijayakumari, and J. T. Puthur. 2012. Seed priming for abiotic stress tolerance: an overview. ***Acta Physiol. Plant.***, 35(5). pp.1381-1396.
- [10] S. Kibinza, J. Bazin, C. Bailly, J. M. Farrant, F. Corbineau, and H. El-Maarouf-Bouteau. 2011. Catalase is a key enzyme in seed recovery from ageing during priming. *Plant Sci.* 181(3). pp. 309-315.
- [11] A. Moosavi, R. Tavakkol Afshari, F. Sharif-Zadehand, and A. Aynehband. 2009. Seed priming to increase salt and drought stress tolerance during germination in cultivated species of Amaranth. *Seed Sci. Technol.*, 37(3). pp. 781-785.
- [12] D. J. Osborne. 1983. Biochemical control systems operating in the early hours of germination. *Can. J. Bot.*, 61(12). pp. 3568-3577.
- [13] N. K. Rao, E. H. Roberts, and R. H. Ellis. 1987. Loss of viability in lettuce seeds and the accumulation of chromosome damage under different storage conditions. *Ann. Bot.*, 60. pp. 85-96.
- [14] V. R. Shelar. 2008. Role of mechanical damage in deterioration of soybean seed quality during storage-a review. *Ag Review*, 29(3). pp. 177-184.
- [15] B. Siri, K. Vichitphan, P. Kaewnaree, S. Vichitphan, and P. Klanrit. 2013. Improvement of quality, membrane integrity and antioxidant systems in sweet pepper (*Capsicum annuum* Linn.) seeds affected by osmopriming. *Australian J. Crop Sci.*, 7 (13). pp. 2068-2073.
- [16] H. O. Sivritepe, and A. M. Dourado. 1995. The effect of priming treatments on the viability and accumulation of chromosomal damage in aged pea seeds. *Ann. Bot.*, 75(2). pp.165-171.
- [17] H.O. Sivritepe, "Genetic Deterioration and Repair in Pea (*Pisum sativum* L.) Seeds During Storage," PhD Thesis, University of Bath, 1992.
- [18] R. R. Stewart and J. D. Bewley. 1980. Lipid peroxidation associated with accelerated aging of soybean axes. *Plant Physiol.*, 65(2). pp. 245-248.
- [19] J. M. Sung and Y.H. Chang. 1993. Biochemical activities associated with priming of sweet corn seeds to improve vigor. *Seed Sci. Technol.*, 21. pp. 97-105.
- [20] F. Xia, L. Chen, Y. Sun, and P. Mao. 2015. Relationships between ultrastructure of embryo cells and biochemical variations during ageing of oat (*Avena sativa* L.) seeds with different moisture content. ***Acta Physiol. Plant.***, 37(4). pp. 1-11.
- [21] X. Xin, Q. Tian, G. Yin, X. Chen, J. Zhang, S. Ng, and X. Lu. 2014. Reduced mitochondrial and ascorbate-glutathione activity after artificial ageing in soybean seed. *J. plant physiol.*, 171(2). pp. 140-147.
- [22] S. Zhang, J. Hu, Y. Zhang, X. J. Xie, and K. Allen. 2007. Seed priming with brassinolide improves lucerne (*Medicago sativa* L.) seed germination and seedling growth in relation to physiological changes under salinity stress. ***Aust. J. Agric. Res.***, 58 (8). pp. 811-815.





# Journal of Global Management Research

- A voice for countries all over the world
- Special attention to developing countries
- Papers accepted in French and English
- Theoretical and practical content



2367-962X

**Institut Fidal Inc.** CP 32089, Montréal, Canada H2L 4Y5

[gmrjournal.uqam.ca/](http://gmrjournal.uqam.ca/)

ISSN 2367-962X