Bisma The Journal of Counseling
Volume 5 Number 3, 2021, pp 196-203
ISSN: Print 2598-3199 – Online 2598-3210
Undiksha – IKI | DOI: http://dx.doi.org/10.23887/bisma.v5i3.42021
Open Access https://ejournal.undiksha.ac.id/index.php/bisma

Rasch Analysis of Indonesian Version Technology Addiction Scale for Students

Dhea Nanda Pratiwi[1], Kadek Suranata[2*)], Kadek Ari Dwiarwati[3]
[1,2,3] Universitas Pendidikan Ganesha, Indonesia
*Corresponding author, e-mail: kadek.suranata@undiksha.ac.id

Received October 02, 2021;
Revised November 31, 2021;
Accepted December. 10, 2021;
Published Online 2021-12-20

Conflict of Interest Disclosures:
The authors declare that they have no significant competing financial, professional or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

Abstract: This study aim at calibrating the Indonesian version technology addiction scale by using the Rasch model analysis. The Rasch model used on this study to get more accurate information about the scales fit and properties. The online survey involved 30 students of junior high school in east of Java Indonesia. There were 71 items of technology addiction from five dimension by initial development. Rasch analysis preform by WINSTEPS 3.73 program to evaluate the validity and reliability of the Indonesian version of technology addictive scale by exanimating the item-person fit measure, alpha Cronbach value, items-person separations index, dimensionality, the response pattern in scalogram, and items biases by gender. The results of this study show that's there was 6 from 71 items that do not meet on the fit criteria and must be eliminated from the scale. The pattern of students' response of every item this scale show that's there were two respondents who indicated exchanging answers, this can be seen from the pattern of respondents' answers which only had differences in the pattern of answers in only three statements. The reliability of person and items in good criteria, 0.91 for item and 0,78 for person, and alpha Cronbach 0,82 is moderate good value. The DIF analysis show that's there were five items gender biases and need to rewrite by the new statement. From total 64 items, the total value of the row variance explain by measure is 98.7%, it means this scale able and with good prediction to measure the technology addiction of the students. The conclusion of the study is about the 64 items of Indonesian version technology addiction scale for student is meet criteria to be a good measurement tool from the Rasch perfective.

Keywords: Rasch perspective, assessment in counseling, addiction.

How to Cite: Dhea Nanda Pratiwi, Kadek Suranata, Kadek Ari Dwiarwati. 2021. Rasch Analysis of Indonesian Version Technology Addiction Scale for Students. Bisma, 5 (3): pp. 196-203, DOI: http://dx.doi.org/10.23887/bisma.v5i3.42021

Introduction

The industrial revolution 4.0 is marked by rapid technological developments, and the urge to use technology in various sectors of life is unstoppable. Technology comes from the Greek "techne" which means art or skill that we can use to solve problems, as well as being able to improve existing solutions to solve certain problems, and also perform or perform functions; Knowledge technology is the creation, modification, use and use of organizational tools, machines, techniques and methods (Liddel, Scott, Jones & McKenzie, 1940, in Ranjan, Uduli, & Bis, 2010).

Students as the young and millennial generation certainly get many opportunities to take advantage of technology. With the development of technology, coupled with the use of appropriate technology. expected to be able to provide opportunities for students in several aspects of life, such as learning, communication, entertainment and so on. Students are given wider opportunities to seek information, this information can be obtained from various media sources by utilizing computers and the internet. Progress makes it easier for students to be able to carry out learning anywhere, the learning process is no longer hindered by technology, humans, space and time. the results of research conducted by (Dwyer, Ringstaff, Haymore, & Sandholtz, 1990) the use of technology with complex network devices can make it easier for students to learn more interactively, and they are easy to complete projects in class. But in reality, the development of technology actually creates many new problems for students at the high school level. Students at the junior high school level are referred to as the post-millennial generation. One of the characteristics is that they grow up with technology and have easy access. The ease of utilizing and accessing technology causes the younger generation to become one of the groups who have a greater risk of experiencing the impact of using technology, namely experiencing bonding.

Addiction is defined as the continuous repetition of a behavior or activity that is not dependent on the adverse or negative consequences of the same thing (Angres & Kathy, 2008). According to (Young, 1998) technology dependence is a habit that forces to engage in the use of technology rather than using it to solve life's problems. A person who is addicted causes them to lose control of their thoughts to avoid them and has difficulty stopping and eliminating the urge to use the object. Technology dependence behavior certainly has a significant influence on students' conditions, both physical, psychological and academic conditions. Research conducted by (Männikkö, Billieux, & Kääriäinen, 2015) states that technology dependence causes fatigue, sleep disturbances, depression and also symptoms of anxiety. (Cheung & Wong, 2011) also stated that technology dependence causes a person to become depressed. Another study (Pay & Slave, 2021) states that there is a positive correlation between the average score of technology dependence and the average total score of social anxiety. If there was an increase in the score for technology dependence, the same was true for the social anxiety score. That is, technology dependence causes a person to experience social anxiety. In addition (Gökbulut, 2019) in his research entitled The Relationship Between Possession and Technology Addiction of High School Students stated that the level of technology dependence of students with high academic achievement was low.

In addition to the description above, the researcher also found facts from the school practicing of guidance and counseling which stated that most of the students indicated dependence on technology. This can be seen from the results of student assessments who stated that it was difficult not to rely on cellphones, and also access the internet at any time. In addition, from the results of observations that have been made, it is found that the intensity of students in operating gadgets is quite high every day. Another fact is that when the learning process takes place, many students prefer to focus on operating their gadgets to surf the virtual world rather than paying attention to the material delivered by the teacher. The same thing happens when the hours are free and between breaks. Most of the students choose to spend their time playing social media instead of interacting with their classmates. On several occasions it was also found that students were late for class because they stayed up all night just to play online games.

As mentioned earlier, dependence on technology will have a serious impact on the physical, psychological, and achievement of students. In terms of the need for handling by providing services that are in accordance with the needs of students. However, before providing a service, a measurement instrument that is suitable and also meets the standards is needed to be used in data collection first, so that with this instrument the data obtained is truly valid. In this case, a technology dependence measurement tool is needed which can later be used to collect data and identify students who are indicated to be technologically dependent, so that later with this measuring tool the counseling services provided can be carried out on target and run well. optimally.

In this scale development research, the approach using the Rasch model is considered more appropriate than using the classical theory model. Where in Rasch this model can later be used to cover the shortcomings of the classical theoretical model, because this Rasch model not only looks at the validity and reliability of the resulting scale, but can also show missing data, similarity in answer patterns. , the level of difficulty of the answers based on the responses. from individuals (Sumintono & Widhiarso, 2013). Rasch analysis, based on Item Response Theory, is able to provide a very effective alternative for exploring the psychometric properties of actions and considering response bias (Bradley, Peabody, Akers, & Knutson,

2015). Considering that the results of the analysis using the Rasch model are quite accurate, this is in line with the aim of this study, namely to produce a scale that meets the standards, so that the resulting scale is indeed feasible to use.

Method

Research Design

An online survey was conducted involving 30 students spread across several junior high schools in East Java. Respondents make response to the Indonesian version of technology addiction which consisted of 71 items. This questionnaire was compiled using a Likert model with 5 response options consisting of SS (very suitable), S (appropriate), KS (not suitable), TS (not suitable), and STS (very inappropriate). In accordance with the Blueprint that has been made previously, we prepared 71 items with 5 answer choices. The technology addiction scale blueprint was prepared based on the theory of Griffith (Griffiths, 1996) and modified by Turel and colleague (Turel, Serenko, & Bontis, 2011) which includes salience, mood modification, tolerance, withdrawal symptoms, and conflict, relapse. The Blueprint of the scale developed is as shown in table 1.

RASCH model analysis through the WINSTEP version 3.73 program. This study was conducted to assess the feasibility of the Indonesian version of the technology addiction scale. Assessment is done through fit order analysis and bubble chart, summary statistics, item dimensionality, person pit order, scalogram, map variable, DIF item.

Table 1. The Blueprint Technology Addiction Scale

Dimension	Indicator	Item number
Importance (Salience)	Behavioral domination	1,2, 25,26,48,49
	Mind domination	3,4,27,28,50,51
	Feeling domination	5,6,29,30,52,53
Mood modification	Feeling on well feeling	7,8,31,32,54,55
	Stres relieve	9,11,33,35,56,58
	Changing mood	10,12,34,57
Tolerance	Enhance the usefully	13,14,36,37,59,60
Withdrawal symptoms	Negatives feeling	15,16,38,39,61,62,53
Conflict	Interpersonal conflict	17,18,40,41,64,65
	Another conflict	19,20,42,43,66,67
Relapse	Tendency to repeated	21,22,44,45,68,69
	Difficulty to control	23,24,46,47,70,71

Results and Discussion

Based on the results of the analysis using the Rasch model, various forms of information were obtained, both in terms of items and respondents who had become subjects or participants of the scale trial (person). The analysis is carried out several times, until the final result is obtained in the form of items that meet the criteria and are also suitable for use.

Fit Order Analysis and Bubble Chart

A fit order analysis was conducted to find out which items did not meet the fit criteria based on the RASCH modeling and had to be discarded and which ones could still be considered. As a consultation, bubble chart analysis is also used to give consideration whether the item deserves to be discarded, or still needs to be maintained. The fit order and bubble chart analysis on this scale was carried out 4 times round until items that met the criteria were obtained.

Table 2. Resume of Fit Order and Bubble Chart analysis

Iteration	Out of fit order	Out of fit by Bubble chart
Iteration - 1	1,61,43	1,61,43
Iteration - 2	71,47	71,74
Iteration - 3	48	48
Iteration - 4	24	24

Based on the results of the analysis of the table above, a fit order analysis was carried out in the first round. The results showed that several items did not meet the criteria, items numbered 1.61, and 43. After looking at the results of the bubble chart, items numbered 1.61, 43 really needed to be removed. After that, the second iteration was carried out. In the second round, it turned out that items that had to be discarded were still found, namely item number 71.74. The third round is carried out, for the third round, items that still need to be discarded are found, namely item number 48. After item 48 is removed, it is continued with the fourth round. In the fourth round, it turns out that there are still items that must be discarded, namely item number 24. The fifth round is carried out to see if there are still items that must be discarded, and from the fifth iteration, the final result of all remaining items has met the criteria, so the final result is 64 question items, and items that fall as many as 1.61, 43, 71, 74, 48, 24.

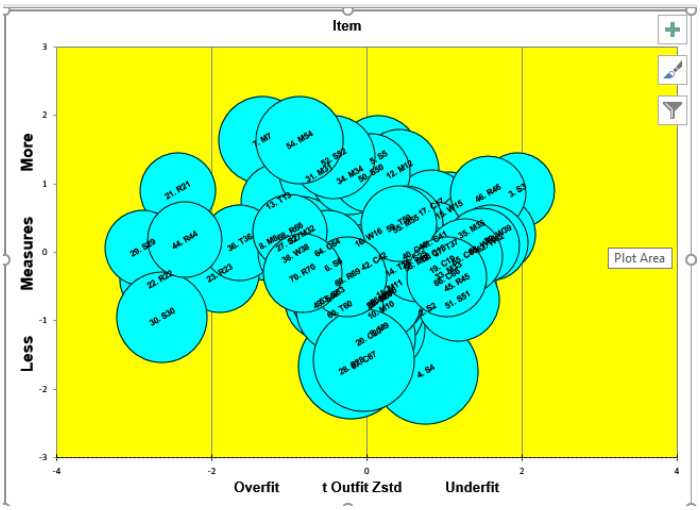
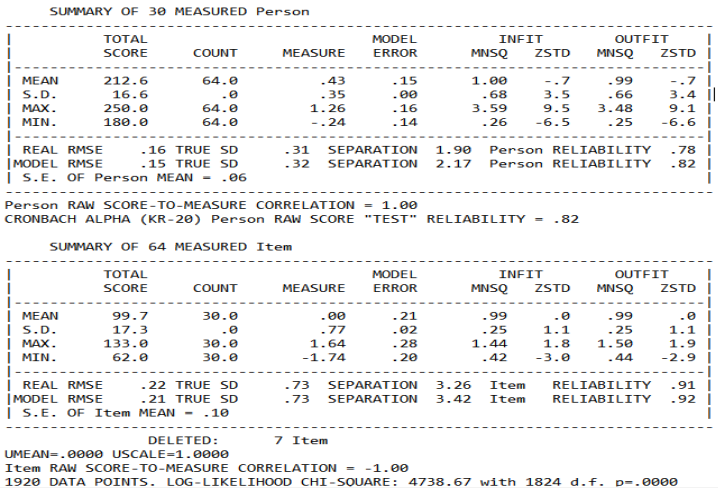


Figure 1. Bubble Chart Item Final

Reliabilities Measures



SUMMARY OF 30 MEASURED Person

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	212.6	64.0	.43	.15	1.00	-.7	.99	-.7
S.D.	16.6	.0	.35	.00	.68	3.5	.66	3.4
MAX.	250.0	64.0	1.26	.16	3.59	9.5	3.48	9.1
MIN.	180.0	64.0	-.24	.14	.26	-6.5	.25	-6.6

REAL RMSE	.16	TRUE SD	.31	SEPARATION 1.90	Person RELIABILITY	.78
MODEL RMSE	.15	TRUE SD	.32	SEPARATION 2.17	Person RELIABILITY	.82

S.E. OF Person MEAN = .06

Person RAW SCORE-TO-MEASURE CORRELATION = 1.00
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .82

SUMMARY OF 64 MEASURED Item

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	99.7	30.0	.00	.21	.99	.0	.99	.0
S.D.	17.3	.0	.77	.02	.25	1.1	.25	1.1
MAX.	133.0	30.0	1.64	.28	1.44	1.8	1.50	1.9
MIN.	62.0	30.0	-1.74	.20	.42	-3.0	.44	-2.9

REAL RMSE	.22	TRUE SD	.73	SEPARATION 3.26	Item RELIABILITY	.91
MODEL RMSE	.21	TRUE SD	.73	SEPARATION 3.42	Item RELIABILITY	.92

S.E. OF Item MEAN = .10

DELETED: 7 Item
UMEAN=.0000 USCALE=1.0000
Item RAW SCORE-TO-MEASURE CORRELATION = -1.00
1920 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 4738.67 with 1824 d.f. p=.0000

Figure 2. Summary Statistic

From the results of these calculations, it can be seen that the Cronbach's Alpha value is 0.82 and the person reliability value is 0.78 which is included in the good category. According to (Sumintono, 2014), the value of the person measure shows the average value of the respondents on the resilience scale. The average value of more than logit 0.0 indicates the tendency of respondents or students to choose varies according to the statements contained in the scale items. The image above also shows the person split index value as well as the split index item. The person separation index value is 1.92, this shows that the scale is capable of detailing the scale into 2 parts, namely the scale that is difficult to agree on, and the easy one to agree on. And the item separation index value is 3.26, this shows that the scale is able to break down the scale into 3 parts, namely students in the high category experiencing technology dependence, students in the medium category, and students in the low category experiencing technology dependence. dependency. With the value of person reliability which is included in the good category, namely 0.78, so it is considered not to exclude some people (students) in the pit order. This is because the lack of fit is covered by fit people, so the reliability is still good.

Item reliability values can also be used to determine the quality of the developed scale. And from the results of the Rasch analysis, the reliability value of the items shows the number 0.91. This shows that the items developed on this scale have good quality, so it can be concluded that the scale is reliable, and the items that have been developed have good quality.

Item Dimensionality

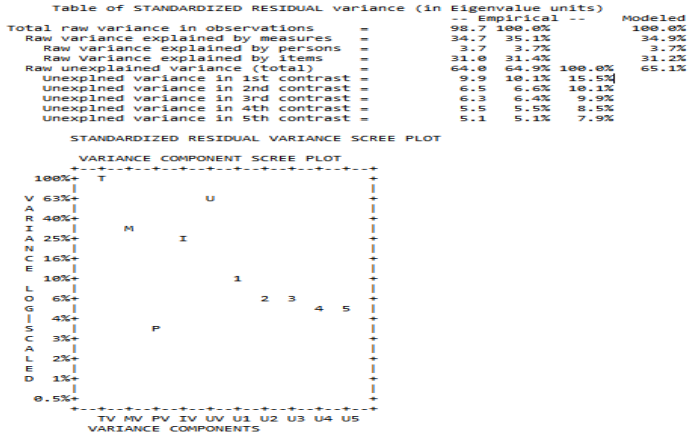


Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

	-- Empirical --		Modeled
Total raw variance in observations =	98.7	100.0%	100.0%
Raw variance explained by measures =	34.7	35.1%	34.9%
Raw variance explained by persons =	3.7	3.7%	3.7%
Raw Variance explained by items =	31.0	31.4%	31.2%
Raw unexplained variance (total) =	64.0	64.9% 100.0%	65.1%
Unexplned variance in 1st contrast =	9.9	10.1% 15.5%	
Unexplned variance in 2nd contrast =	6.5	6.6% 10.1%	
Unexplned variance in 3rd contrast =	6.3	6.4% 9.9%	
Unexplned variance in 4th contrast =	5.5	5.5% 8.5%	
Unexplned variance in 5th contrast =	5.1	5.1% 7.9%	

STANDARDIZED RESIDUAL VARIANCE SCREE PLOT

VARIANCE COMPONENT SCREE PLOT

TV MV PV IV UV U1 U2 U3 U4 U5
VARIANCE COMPONENTS

Figure 3. Item Dimensionality

The total value of the line variance in the observations shows a percentage of 98.7%. This means that 98.7% of this scale is able to predict and also measure a variable, namely technology dependence. The minimum measurement percentage is 20%, and if below 20%, re-analysis is required, or by deleting items or people.

Scalogram

Scalogram analysis is used to determine the pattern of answers from respondents. Data from the scalogram can be used to find out whether there are respondents who exchange or cheat answers. The pattern of answers from the respondents will be seen, so that we can find out whether there is a strange pattern of answers from the respondents, or the pattern of answers that are exactly the same. In the development of this scale there are two patterns of answers that are almost the same. It can be indicated that it is very likely that these 2 respondents exchanged answers, namely respondents with codes 21L and 02L. This can be seen clearly from the pattern of their answers which only have 3 different answer items, and the answers for the other items are the same.

Variabel Map

The results of data analysis with the RASCH model also provide more accurate data, one of which is a description of student data and also scale items. Data from the map variable shows that when viewed from the indicator points, indicators number 28, and 4 are the lowest indicators owned by students. This indicator is the most difficult indicator to agree on, so it is the lowest indicator with the editorials "Saya merasa lebih fokus melakukan kegiatan apapun ketika sedang tidak bermain video game" (I feel more focused on doing any activity when I am not playing video games) and "Saya merasa leboh fokus melakukan kegiatan apapun ketika sedang tidak bermain internet" (I feel more focused on doing any activity when I am 'not playing the internet). The indicator with a high category is an indicator with a number of 54.7 with the editor "Suasana hati saya (mood) membaik setelah mengoperasikan ponsel, pc,atau computer" (My mood improves after operating a cellphone, pc, or computer) and " Ada perasaan senang saat mengakses internet" (There is a feeling of pleasure when accessing the internet).

When viewed from the map variable data, it can also be concluded that this scale has a good scale category, because many scale items are in the middle, so that later the curve will resemble a normal curve. In addition, it can also be concluded that many students experience technology dependence above average. This can be seen in Figure 4.

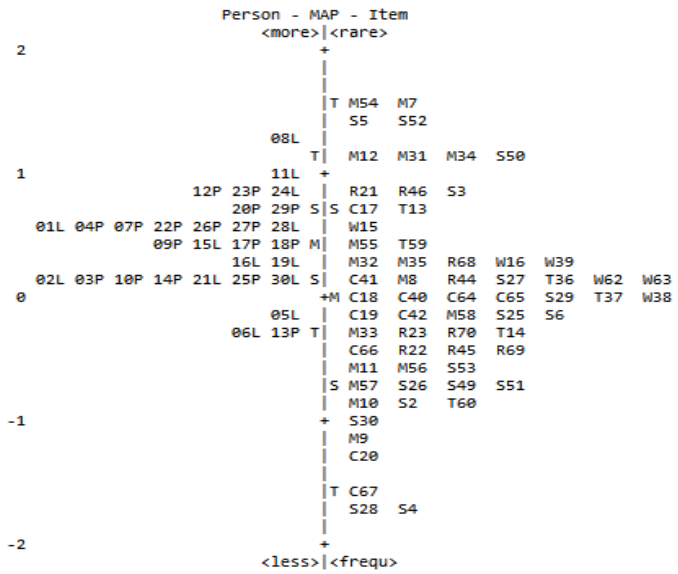


Figure 4. Wright Map

DIP – Item

DIF – item shows the DIF for each gender of the respondent, as shown in Fig. 5.

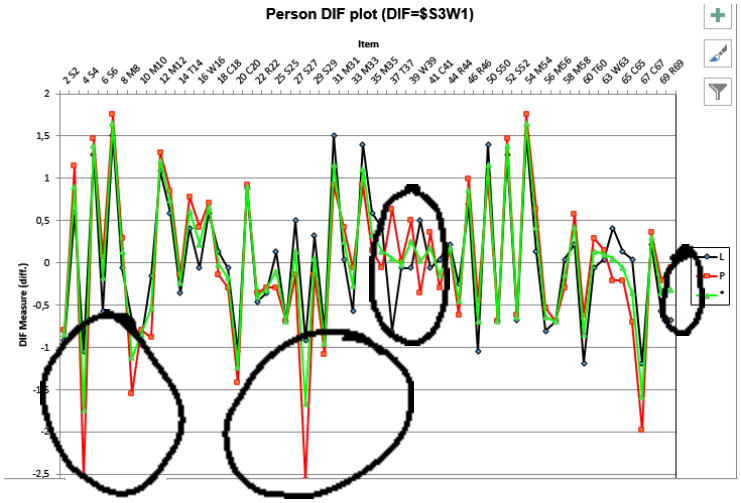


Figure 5. DIP -Item

On the DIF graph, the green curve represents the ideal curve, and the dark blue curve represents the male gender, and the red curve represents the female gender. DIP – Items from the developed scale indicate that there are some items that have a distorted curve pattern. The curve is characterized by the presence of the most extreme curves, namely 1 upward curve and 1 downward curve. On this developed scale, there are several deviant items, namely items numbered 37,39,40, 63, and 69. The deviant items can be caused by item statements that only lead to 1 gender, so the curves shown are very different. As in point 37 (T37) the tolerance indicator tends to be more agreed by female respondents than male respondents. Therefore, it is necessary to test these statements so that they do not contain gender bias.

Conclusion

Based on the results of the analysis using the RASCH model on 71 items of the technology dependence scale for junior high school students, 64 items were found that were valid and also suitable for use, and 7 items were discarded because they were not appropriate. meet item fit standards based on the RASCH measurement model. Thus, it can be concluded that the scale that has been developed can be used, considering that the scale that has been produced is in accordance with the standards and is included in the good category.

Acknowledgement

Thank you for Guidance and Counseling Department, Universitas Pendidikan Ganesha Singaraja, Bali, Indonesia who has provided the opportunity and supported the completion of this research on the development of the scale of technology addiction for students.

References

Angres, D. H., & Kathy, A. B. (2008). The Disease of Addiction: Origins, Treatment, and Recovery. Disease-a-Month, 54(10), 696–721. https://doi.org/10.1016/j.disamonth.2008.07.002

Bayar, B., & Budak, F. (2021). How technology addiction affects social anxiety in adolescent girls? A sample of Turkeys southeast. Medicine Science | International Medical Journal, 10(3), 1. https://doi.org/10.5455/medscience.2021.02.057

Bradley, K. D., Peabody, M. R., Akers, K. S., & Knutson, N. M. (2015). Rating Scales in Survey Research: Using the Rasch model to illustrate the middle category measurement flaw. Survey Practice, 8(1), 1–12. https://doi.org/10.29115/sp-2015-0001

Cheung, L. M., & Wong, W. S. (2011). The effects of insomnia and internet addiction on depression in Hong Kong Chinese adolescents: An exploratory cross-sectional analysis. Journal of Sleep Research, 20(2), 311–317. https://doi.org/10.1111/j.1365-2869.2010.00883.x

Dwyer, D. C., Ringstaff, C., Haymore, J., & Sandholtz, P. D. (1990). Apple Classrooms of Tomorrow. Educational Leadership, 51, 4–10. Retrieved from http://www.psfshl.pudong-edu.sh.cn/E-Learning/ACOT/rpt08.pdf

Gökbulut, B. (2019). The Relationship Between Sense of Belonging and Technology Addiction of High School Student. International Journal of Eurasian Education and Culture, 4(7), 281–297. https://doi.org/10.35826/ijoecc.46

Griffiths, M. (1996). Nicotine, tobacco and addiction [3]. Nature, 384(6604), 18–19. https://doi.org/10.1038/384018a0

Männikkö, N., Billieux, J., & Kääriäinen, M. (2015). Problematic Digital Gaming Behavior and its Relation to the Psychological, Social and Physical Health of Finnish Adolescents and Young Adults. Journal of Behavioral Addictions, 4(4), 281–288. https://doi.org/10.1556/2006.4.2015.040

Ranjan, J., Uduli, M., & Bis, R. (2010). Addiction to Technological Gadgets and Its Impact on Health and Lifestyle: A Study on College Students Unde r the supervision of. (412).

Sumintono, B. (2014). Model Rasch untuk Penelitian Sosial Kuantitatif. ITS Surabaya, (November 201), 1–9. Retrieved from http://deceng3.wordpress.com

Sumintono, B., & Widhiarso, W. (2013). Aplikasi Model Rasch Untuk Penelitian Ilmu-Ilmu Sosial.

Turel, O., Serenko, A., & Bontis, N. (2011). Family and Work- Related Consequences of Addiction to Organizational Pervasive Technologies. Information and Management, 48(2–3), 88–95. https://doi.org/10.1016/j.im.2011.01.004

Young. (1998). Caught In The Net: How To Recognize The Signs Of Internet Addiction And a Winning Strategy For Recovery. Retrieved October 26, 2021, from https://books.google.co.id/books?hl=id&lr=&id=kfFk8-GZPD0C&oi=fnd&pg=PA1&dq=Caught+in+the+net:+how+to+recognize+the+signs+of+internet+addiction+and+a+winning+strategy+for+recovery.&ots=gFfSIdQTi_&sig=ntQR6juCyoP92AR4cQ0fBx4YAeo&redir_esc=y#v=onepage&q=Cau

Article Information (Supplementary)

Conflict of Interest Disclosures:

The authors declare that they have no significant competing financial, professional or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

First Publication Right: BISMA The Journal of Counseling

http://dx.doi.org/10.23887/bisma.v5i3.42021

Word Count: