

<https://doi.org/10.48047/AFJBS.6.Si4.2024.5239-5248>

African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>

Research Paper

Open Access

Development and psychometric evaluation of the social network educational use scale (SNES-18): a validity and reliability study

Ayed adel¹, Salem Moula², Fairouz Azaiez³¹ Search Unit: Sport Sciences, Health and Movement, High Institute of Sport and Physical Education of kef, University of Jendouba, Kef 7100, Tunisia² High Institute of Sport and Physical Education of Sfax, University of Sfax, Tunisia³ High Institute of Sport and Physical Education of Gafsa, University of Gafsa, Tunisiaadel.ayed@issepgf.ugaf.tn

Volume 6, Issue Si4, Aug 2024

Received: 15 June 2024

Accepted: 25 July 2024

Published: 15 Aug 2024

doi: [10.48047/AFJBS.6.Si4.2024.5239-5248](https://doi.org/10.48047/AFJBS.6.Si4.2024.5239-5248)

ABSTRACT

The sample of this study includes 641 Tunisian school students aged between 13 and 16 years (42.3%) and between 17 and 20 years (57.7%). Among them, 258 are boys and 383 are girls. Four hundred and twelve subjects (64.3%) were middle school students at the time of data collection, while two hundred and nine were high school students (35.7%). In addition, 37% of students are affiliated with civil associations and clubs, while 63% only practice sport during physical education sessions. The sample was divided into two groups randomly: the first group (n = 301) for the exploratory factor analyzes and the second group (n = 340) for the confirmatory factor analyses. The test-retest results showed strong stability over time for the "feelings of competence" dimension. The dimensions "shared learning", "sports motivation" and "perceived usefulness" also showed acceptable values. Internal consistency, measured by the α -Cronbach index, was high (0.94 with a confidence interval of 0.90 to 0.95). Confirmatory factor analysis validated the hypothesis of a unidimensional structure. All the elements of social network educational use scale (SNES-18) among students are grouped on a single dimension. In conclusion, this instrument is short, pleasant and innovative, with good psychometric properties

Keywords: Shared learning, feeling of competence, sporting motivation, perceived usefulness, social network

1 Introduction

Physical education occupies a fundamental place in the overall development of individuals, promoting health, physical fitness, and well-being (Edwards, Ngcobo, Edwards, & Palavar, 2005). In today's digital age, the integration of e-learning in physical education has evolved significantly (Rohr, Costello, & Hawkins, 2015). This transformation has led to the need to develop online learning environments specifically adapted to this discipline. To guarantee the effectiveness of these environments, it is essential to have valid and reliable measurement instruments to evaluate their

performance and their suitability for educational needs. With this in mind, this study aims to develop a measuring instrument which may require several redundancies to achieve a valid and reliable instrument (DESBIENS, Naila, SPALLANZANI, VANDERCLEYEN, & BEAUDOIN, 2018). Methodological rigor is essential to ensure that our instrument accurately measures what we wish to study (Bouletreau, Chouaniere, Wild, & Fontana, 1999).

Online learning in physical education is part of the broader context of the evolution of teaching and learning, marked by the transition to distance and hybrid teaching modalities (Charlier, Deschryver, & Peraya, 2006). The validation of this instrument is of crucial importance for physical educators, researchers, and educational institutions, because it will make it possible to accurately measure the effectiveness and adaptability of virtual environments dedicated to this discipline.

This study lays the foundations for the validation of the instrument, highlighting the importance of its development in the context of online physical education and highlighting the issues surrounding this approach. It also invites the reader to understand the potential impact of this research on improving the quality of teaching in physical education in the digital age (Bernier, 2016; El Louadi, 2001; Khadir, 2021), of educational sciences (Fraser & Treagust, 1986; Genoud, 2008; Shariff, 2005), of psychometrics (Alem, 2013; Facon, 2007; Spaeth, 2009).

Some recent studies suggest that online interactions can effectively motivate students and, in turn, get them engaged in their learning (Rasheed et al., 2020). In order to ensure the quality of interactions, clear indications must be given in the field of physical and sports education. Our second dimension to test in this instrument was shared learning. Certainly, studies carried out by researchers in educational technologies show that they can be formidable educational tools (Ansari & Khan, 2020). The majority of Tunisian high school students between 16 and 19 years old were observed connecting to a social network such as MySpace, Facebook or other discussion forums. The main idea leads us to think about the two other dimensions of the scale such as feelings of competence (Kalajas-Tilga, Koka, Hein, Tilga, & Raudsepp, 2020) and perceived usefulness (Wallace, Scanlon, & Calderón, 2023). The objective of this study was to assess these dimensions and develop an instrument that measures the appreciation of the educational use of technology and information in physical education.

2 Materials and methods

Composed of 18 items, the social network educational use scale (SNES-18), an instrument which makes it possible to identify the development of a new evaluation tool aimed at school students (Kabilan, Ahmad, & Abidin, 2010; Rapeli, 2016). After generating all the items for our questionnaire, we proceeded with their verification by the experts. The comments of the experts are to bring together convergences and consensus on the dimensions and items of the concept of the instrument. It is then a matter of submitting to these experts the initial questionnaire covering the proposed items. For this, we chose for this study teachers in the field of didactics of physical and sports activities and teachers in human sciences.

Firstly, the students (solicited on a voluntary basis) were invited to complete the questionnaire presented in Arabic languages. After this request, a first invitation to respond to the questionnaire was sent, in which we again asked for their agreement to contact them again as part of the retest. Two weeks after responding to the IUPRSEP for the first time, participants were asked to respond again. These two tests were administered after the first invitation to participate. Participants were

asked to use the same nickname for both tests. No financial or material incentives were offered. This data collection took place from February 2023 to March 2023 using SPSS software.

The sample for this stage being 17 students aged 13 to 16 (42.5%) and 23 students aged 17 to 20 (57.5%), 16 boys (40%) and 24 girls (60%); 26 students were enrolled in colleges (65%) and 14 students (35%) in secondary education. 14 students (35%) were affiliated with sports clubs and 26 who were not affiliated (65%)

Tableau1. Stabilité dans le temps (fiabilité test-retest)

The dimensions of the instrument	Alpha Cronbach N = 40		Number of items	r- de Pearson
	Test	Retest After 2 weeks		
Feelings of competence	0,95	0,91	6	0,96
Shared learning	0,71	0,79	4	0,93
Motivation	0,81	0,78	5	0,94
Perceived usefulness	0,84	0,78	3	0,80

The correlation coefficient (r) therefore represents the correlation between the results obtained at the two tests (Girouard, Morin, & Tassé, 1998). Thus, the test-retest correlation coefficient is high (from 0.80 to 0.96) which explains that the instrument has good reliability and will give constant results. According to some researchers, test-retest stability is a better indicator of the metric quality of an instrument than are other reliability indices (McCrae, Kurtz, Yamagata, & Terracciano, 2011).

The factors are extracted based on the analysis of the plot of eigenvalues (Cattell criteria) and eigenvalues greater than 1 (Kaiser criterion). An item is considered to contribute significantly to a factor when its factor loading is greater than or equal to 0.40, in accordance with the recommendations and choice of experts. The results suggest the presence of four factors with an eigenvalue greater than 1. The total eigenvalues amount to 11.29 and explain 56.46% of the variance. These factors contain numerous ambiguities of meaning, and certain items (n = 8) saturate in several factors.

3 Verification of the reliability of the social network educational use scale (SNES-18): Exploratory factor analysis (EFA)

After having solicited, on a voluntary basis, young Tunisians through their schools or social networks to participate in psychological research relating to the educational use of social networks in physical education, the volunteers' questionnaires were recovered. After obtaining free and informed consent from participants or legal guardians, for minor adolescents, the questionnaire was administered

individually during the period from February 2024 to May 2024. All data were collected by questionnaires accompanied by an explanatory note on the response procedure for each questionnaire and information relating to the anonymity and confidentiality of the data collected. The average administration time was 15–20 minutes. Participation in this study was voluntary and was not subject to any compensation.

After collecting the data and describing the sample (table 2), and following the approach recommended by (Churchill Jr, 1979), It is appropriate to verify the dimensionality of the scale of the inventory of educational use of social networks in physical education. To do this, we carried out an exploratory factor analysis (principal component analysis with varimax rotation using SPSS version 26 software), in accordance with the suggestions of Hair et al. (1998). EFA is a “preliminary technique when constructing a measurement scale”(Gerbing & Anderson, 1988). It makes it possible to identify latent factors from measured variables.

Table 2. Sample characteristics

variables	Participants (n = 641)
Age	
From 13 to 16 years old	271 (42,3 %)
From 17 to 20 years old	370 (57,7 %)
Gender	
Boy	258 (40,2 %)
Girl	383 (59,8 %)
Schooling	
Preparatory cycle	412 (64,3 %)
Secondary cycle	229 (35,7 %)
Sports affiliation	
Affiliated	237 (37%)
Not affiliated	404 (63 %)

Participants responded to the 18 items of the evaluated version of the questionnaire. These items are divided into four factors corresponding to a statement concerning the feeling of competence, self-directed learning, sporting motivation and the perceived usefulness of the subject.

This study repeated the EFA on a validation sample to confirm that the factor structure is consistent using the same sample (n=641) by dividing it into two groups (one for the EFA and one for the CFA). . The design of a confirmatory model which specifies how the items are supposed to be linked to the factors identified during the AFE was designed by specialized software (AMOS) to ensure the

parameterization of the model: Assign factor loadings, covariances between the factors, residual variances, etc., in our CFA model.

Tableau 3 . Résultats de l'analyse factorielle

Components	Initial eigenvalues			Extraction of sums of squares from the retained factors			Sum of the squares of the factors retained for the rotation
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total
Feelings of competence	7,79	43,32	43,32	7,79	43,32	43,32	5,76
Shared learning	4,31	23,99	67,32	4,31	23,99	67,32	3,93
Sports motivation	2,26	12,59	79,91	2,26	12,59	79,91	3,43
Perceived usefulness	1,65	9,20	89,11	1,65	9,20	89,11	2,90

Table 4 . Factorial structure of social network educational use scale (SNES-18)

	Factors			
	1	2	3	4
1. Social networks increase interactivity and exchanges between teachers and students in physical education and sports.	0,97			
2. The use of innovative tools in physical education promotes creativity	0,94			
5. Social media helps identify common errors in motor learning in detail	0,96			
6. I use social media for the purpose of sharing workouts, following athletes, discussing sports-related topics, etc.)	0,96			
10. I have already participated in online discussions and groups focused on sports activity in general.	0,95			
11. I am confident in my ability to find information on social media myself.	0,96			
3. The creation of educational resources such as infographics, games, videos is within the reach of any teacher.		0,93		
7. I can use videos and tutorials found on social media to improve my sports skills		0,93		
12. Social media allows students to communicate with each other and broadcast their activities live		0,93		
18. Using online learning increases my sports knowledge.		0,92		
4. I am motivated to follow influential sports accounts on social media for inspiration and advice.			0,83	
8. Interacting with peers on social media strengthens my interest in sports and my engagement in sporting activities.			0,85	

9. I am motivated to document and share my own athletic progress on social media for feedback and advice.			0,68	
15. Social media gives me the opportunity to ask questions and get quick answers to my sporting concerns.			0,86	
16. Using social networks reinforces my motivation to continue my sports training.			0,64	
13. I find social networks a useful source of advice and recommendations to improve my sports skills.				0,95
14. I feel like social media is an effective tool for keeping up with the latest trends and innovations in sports.				0,93
17. Social media provides me with a platform to share my own sporting experiences and get constructive feedback.				0,92

KMO = 0,851

We can intuitively think that middle or high school students who use social networks for educational purposes in sport compared to those who do not use them may benefit from stronger relational skills due to the possible learning linked to support. of digital collaboration. We therefore conducted an analysis of variance on the dimensions of feelings of competence, shared learning, sports motivation and usefulness. perçue.

4 Estimation of the validity of (SNES-18): Confirmatory Factor Analysis (CFA)

Secondly, we carried out a confirmatory factor analysis (CFA) in order to ensure that the dimensions estimated by the first-order factors actually define a broader and more abstract construct estimated by the second-order factor and certify the reliability and validity of this measuring instrument. Confirmatory factor analysis (CFA) is one of the main applications of structural equation models. This analysis makes it possible to test the fit and the factorial structure of the measurement model identified by the exploratory analysis, to verify the convergent validity and the reliability of the measurement instrument and finally to test the discriminant validity of the subscales of the concept. analysis. The contribution of these methods (unlike regression) is to allow the processing of simultaneous estimates of several dependence relationships, and to include measurement errors in the estimation process. (Gardès, 2018). The resolution principle consists of comparing two types of matrices: the matrix S of covariances and correlations of observed variables and the matrix Σ of estimated covariances or correlations. The closer the elements of the two matrices are to each other, the better the factor structure model fits the data. In order to establish the measurement scale for the educational use of social networks, we first adjusted the measurement model before validating it. The majority of researchers opt for the two-step approach of Gerbing and Anderson (1988).

We made the hypothesis that the measurement models are reflective: each item is a manifestation of the construct and all items covary together. The chosen indicators are supposed to represent the influence of the underlying latent constructs. For example, the feeling of competence influences sporting motivation. The causal relationship operates from the construct to its indicators. The analysis of the variances and covariances between factors and between items of the scale allows us to arrive at a four-factor model (figure).

The fit was evaluated on the basis of the indices provided by AMOS, that is to say: (a) the ratio of Chi-square/number of degrees of freedom (χ^2/df) which must be between 1 and 5; (b) the RMSEA (root mean square error of approximation) which must be less than 0.05 and (c) the GFI (goodness-of-fit index), CFI (comparative fit index), AGFI (adjust good fit index)) which must be greater than 0.9.

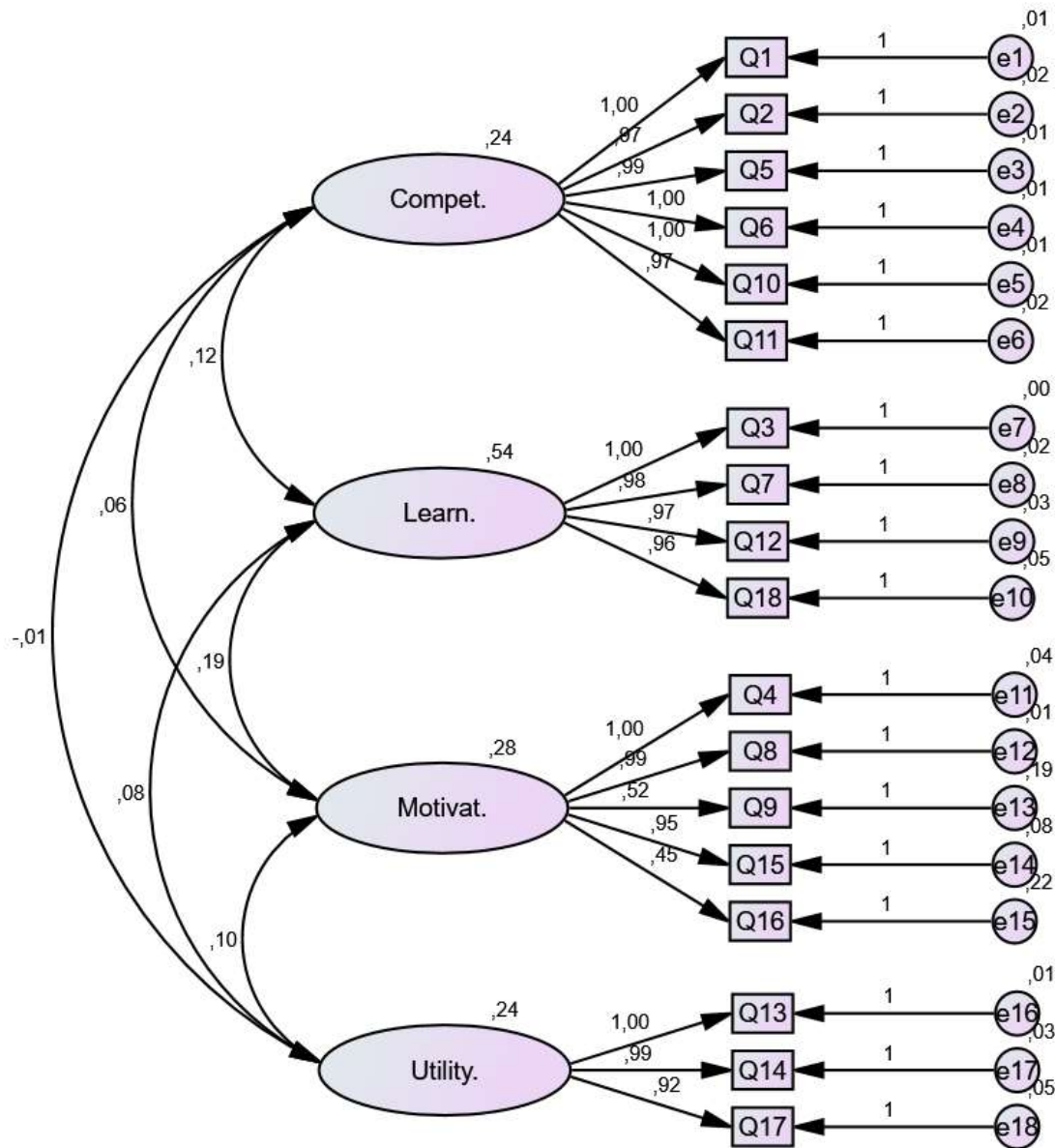


Figure 1. Measurement model of (SNES-18)

The indices implemented for the relational competence scale - RMSEA (0.047), GFI (0.956), CFI (.982), and AGFI (0.918) - exceeded the recommended threshold values (Table 6). The chi-square ratio by the number of degrees of freedom (1.335) is within the recommended range, and even less than 0.2, the maximum threshold accepted by certain authors. Thus, all indices show a good fit of the measurement model to the empirical data. The averages of the regression coefficients obtained by bootstrap are significant at the 5% level and very close to the estimates of the original sample. This is in agreement with the observation of (Schwartzman, Gold, Andres, Arbuckle, & Chaikelson, 1987). Depending on which the results are most often a little different. The confidence intervals are significant for all the regression coefficients linking the items to the latent variables (feelings of competence, shared learning, sporting motivation and perceived usefulness). These results justify the multidimensional aspect of the scale. This assessment tool represents a significant contribution to physical education research and social media pedagogy, providing a solid framework for the analysis and continuous improvement of the use of these platforms in teaching and education. 'learning. We hope that this tool will be widely adopted and used to support the development of best practices and improvement of physical education in the digital age

4 Conclusion

We have developed a solid questionnaire that allows us to accurately and reliably assess the impact of social networks on learning physical education. Using appropriate statistical methods, we confirmed the internal consistency of the questionnaire items, meaning that the responses obtained are stable and consistent over time.

We tested the external validity of the questionnaire by comparing it to other measures or correlating it with related variables. This helped to strengthen the validity of our instrument.

This validated questionnaire can serve as a solid basis for future research in this area. It provides researchers with an effective way to collect data on the impact of social media on physical education learning.

In conclusion, this questionnaire validation study represents an important step in research on the impact of social networks on motor learning. The validated questionnaire is a valuable tool that can be used to deepen our understanding of this complex issue. It also offers the opportunity to guide educational policies and contribute to the improvement of physical education teaching in an increasingly digital and connected world.

REFERENCES

- Alem, F. (2013). Développement et validation d'un instrument de mesure de e-Learning readiness dans le contexte universitaire/thèse présentée comme exigence partielle du doctorat en administration des affaires par Farid Alem;[directeur de recherche, Michel Plaisent].
- Ansari, J. A. N., & Khan, N. A. (2020). Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environments*, 7(1), 1-16.
- Bernier, V. (2016). *Effets d'un projet de formation-accompagnement sur le sentiment d'efficacité collective à prévenir et gérer les comportements difficiles au primaire*. Université Laval,
- Bouletreau, A., Chouaniere, D., Wild, P., & Fontana, J. M. (1999). *Concevoir, traduire et valider un questionnaire. A propos d'un exemple, EUROQUEST*. Retrieved from <https://hal-lara.archives-ouvertes.fr/hal-01420163>

- Charlier, B., Deschryver, N., & Peraya, D. (2006). Apprendre en présence et à distance: une définition des dispositifs hybrides. *Distances et savoirs*, 4(4), 469-496.
- Churchill Jr, G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of marketing research*, 16(1), 64-73.
- DESBIENS, J.-F., Naila, B., SPALLANZANI, C., VANDERCLEYEN, F., & BEAUDOIN, S. (2018). Validation d'un instrument pour mesurer les préoccupations d'enseignants stagiaires en ÉPS tunisiens. *Anadolu University Journal of Education Faculty*, 2(2), 158-177.
- Edwards, S. D., Ngcobo, H. S., Edwards, D. J., & Palavar, K. (2005). Exploring the relationship between physical activity, psychological well-being and physical self-perception in different exercise groups. *South African Journal for Research in Sport, Physical Education and Recreation*, 27(1), 59-74.
- El Louadi, M. (2001). Le coefficient de fiabilité et la multidimensionalité des mesures en systèmes d'information. *Université de Tunis*.
- Facon, B. (2007). Sur la différenciation des aptitudes cognitives de l'enfant. *European Review of Applied Psychology*, 57(4), 213-223. doi:<https://doi.org/10.1016/j.erap.2006.10.002>
- Fraser, B. J., & Treagust, D. F. (1986). Validity and use of an instrument for assessing classroom psychosocial environment in higher education. *Higher education*, 15(1-2), 37-57.
- Gardès, N. (2018). Développement et validation d'une échelle de mesure de la compétence relationnelle du dirigeant et analyse de son impact sur l'accompagnement financier. *Finance Contrôle Stratégie*(21-1).
- Genoud, P. (2008). Validation d'un instrument mesurant le climat d'études perçu par les étudiants universitaires. *Mesure et évaluation en éducation*, 31(1), 31-49. doi:<https://doi.org/10.7202/1025012ar>
- Gerbing, D. W., & Anderson, J. C. (1988). An updated paradigm for scale development incorporating unidimensionality and its assessment. *Journal of marketing research*, 25(2), 186-192.
- Girouard, N., Morin, I. N., & Tassé, M. J. (1998). Étude de fidélité test-retest et accord interjuges de la grille d'évaluation comportementale pour enfants Nisonger (GÉCEN): Test-retest and interjudge reliability study of the grille of comportemental evaluation for nisonger children (GECEN). *Revue francophone de la déficience intellectuelle*, 9(2), 127-136.
- Kabilan, M. K., Ahmad, N., & Abidin, M. J. Z. (2010). Facebook: An online environment for learning of English in institutions of higher education? *The Internet and higher education*, 13(4), 179-187.
- Kalajas-Tilga, H., Koka, A., Hein, V., Tilga, H., & Raudsepp, L. (2020). Motivational processes in physical education and objectively measured physical activity among adolescents. *Journal of Sport and Health Science*, 9(5), 462-471. doi:<https://doi.org/10.1016/j.jshs.2019.06.001>
- Khadir, M. (2021). Analyse critique des modèles de succès des systèmes d'information en vue de la proposition d'un modèle conceptuel de la continuation d'utilisation.
- McCrae, R. R., Kurtz, J. E., Yamagata, S., & Terracciano, A. (2011). Internal consistency, retest reliability, and their implications for personality scale validity. *Personality and social psychology review*, 15(1), 28-50.
- Rapeli, H. (2016). *L'usage des réseaux sociaux dans l'enseignement et l'apprentissage des langues étrangères-étude comparative entre la France et la Finlande*.
- Rasheed, M. I., Malik, M. J., Pitafi, A. H., Iqbal, J., Anser, M. K., & Abbas, M. (2020). Usage of social media, student engagement, and creativity: The role of knowledge sharing behavior and cyberbullying. *Computers & Education*, 159, 104002. doi:<https://doi.org/10.1016/j.compedu.2020.104002>
- Rohr, L. E., Costello, J., & Hawkins, T. (2015). Design Considerations for Integrating Twitter into an Online Course. *International Review of Research in Open and Distributed Learning*, 16(4), 241-249. doi:<https://doi.org/10.19173/irrodl.v16i4.2376>
- Schwartzman, A. E., Gold, D., Andres, D., Arbuckle, T. Y., & Chaikelson, J. (1987). Stability of intelligence: A 40-year follow-up. *Canadian Journal of Psychology/Revue canadienne de psychologie*, 41(2), 244.

- Shariff, S. (2005). Cyber-dilemmas in the new millennium: School obligations to provide student safety in a virtual school environment. *McGill Journal of Education/Revue des sciences de l'éducation de McGill*, 40(3).
- Spaeth, A. (2009). *Sélection de question et choix de classificateur pour questionnaires adaptatifs*. École Polytechnique de Montréal,
- Wallace, J., Scanlon, D., & Calderón, A. (2023). Digital technology and teacher digital competency in physical education: a holistic view of teacher and student perspectives. *Curriculum Studies in Health and Physical Education*, 14(3), 271-287.