Development and Validation of Scenarios for the assessment of Project Management People Competences

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Abstract

The development of project management competences, particularly people competences, is a challenging and complex process. Scenario-based learning is an interesting approach to developing these competences, involving real problems that allow you to face challenges based on your own experience. In this sense, scenarios act as the starting point for diving into a real-world problem and fostering the whole process of decision making and searching for solutions. The International Project Management Association (IPMA) has defined an Individual Competence Baseline (ICB 4.0) standard for the development of the project management area of knowledge. The standard shows, besides other competences, the following 10 people competences: personal communication; leadership; teamwork; self-reflection and self-management; personal integrity and reliability; relationships and engagement; resourcefulness; conflict and crisis; negotiation; and result orientation. Development and assessment of these competences are increasingly important for the people working on projects. In addition, there is an accreditation process for these professionals that is increasingly required by organizations. The process involves an assessment of technical qualifications to improve task performance. In this sense, this paper aims to describe the development and validation of ten project management scenarios that allow the assessment of people competences. The methodology of the study comprised six phases. In addition, two pilot applications were conducted with the proposal to assess competence of the scenarios developed. The findings reveal that the scenarios can be used as an alternative approach to the accreditation process of professionals who work in project management.

Keywords: Competences Development; Scenario-Based Learning; Project management; Engineering Education.

1. Introduction

The world is in permanent change. People, processes, and environments change and evolve at an ever-increasing rate in a world characterized by marked interconnections and externalities. Given this, it is quite naive to think that projects, and the individuals who participate in and manage them, will not need to adapt to and embrace change and uncertainty in order to successfully achieve their outlined goals (López-Alcarria, Olivares-Vicente, & Poza-Vilches, 2019). The people who manage projects (the project management community of practice) are increasingly requiring the development and assessment of these professionals (Alam, Gale, Brown, & Kidd, 2008).

As learning becomes more personalized and requires adjustment to changing conditions and requirements while meeting rigorous accreditation standards, new forms of assessment are needed (López-Alcarria, Olivares-Vicente, & Poza-Vilches, 2019). The use of scenarios, i.e., challenging situations inspired by project management practices, can be a valuable tool for both organizations and individuals to develop and assess their competencies. There is a growing interest in development and assessment of project management competence (Crawford, 2005).

In this regard, the research question of the study sought to understand, "In what ways do scenarios enable the assessment of project management competency?" The main purpose of this study is to describe the development and validation of Project Management scenarios for the assessment of competencies defined by the Individual Competence Baseline

2. Background

Recognized as a profession in the mid-20th century (PMI, 2017), project management continues to evolve, and as old methods undergo modifications, there is the creation of new tools and the emergence of research with new viewpoints in the profession (Wawak & Woźniak, 2020). This evolution represents the creation of several benchmarks that can be used as a basis for professional development and assessment. The Individual Competence Baseline (ICB4) is a reference source

for those seeking a method option in project management that is more focused on the human aspects of management, namely people competences (IPMA, 2015).

This benchmark was developed by IPMA (2015) and describes a coherent inventory of competence elements that an individual needs to have or develop to successfully master the work package, project, program or portfolio they have been assigned to manage (IPMA, 2015). Furthermore, it does not detail the competences by specific roles (e.g., project manager or planning specialist) but rather in terms of what is required in the domain of project, program, and portfolio management (Vukomanović et al., 2016).

The individual "competence" is the application of knowledge, skills and abilities in order to achieve the desired results (ICB4). The concept of competence is strongly associated with the ability to master complex situations. In the professional world, accreditation and training of professionals through proficiency testing is strongly demanded by organizations (Erol et al., 2016). The process involves the assessment of competences required for improvement in task performance. In the study of (Erol et al., 2016) a scenario-based Industry 4.0 was developed to assess how common problem engineering competences can improve performance.

Several research papers have focused on the development scenarios to assess competences (Ilahi et al., 2014). However, competence assessment is not very well researched in the context of project management, and there is a gap in competence assess models (Ilahi et al., 2014). In this sense, although changes have occurred as a result of the emphasis on competence-based learning, both in the academic and professional worlds, assessment processes are often based on traditional models (Ilahi et al., 2014). In fact, in the practical world, professionals or academics are more often faced with situations where they have to apply their acquired competences, but they are still examined by traditional assessment models (Ilahi et al., 2014).

In the fields of Medicine and Nursing, one of the approaches used to assess competences is centred on the principles of competence assessment through simulated scenarios (Hagler & Wilson, 2013; Waxman, 2010). In general, this approach of scenario can be used both for assessment and for learning purposes, where the individual passes through a simulated situation that is aligned with the behaviour they would adopt in a similar situation in real life (Banerjee, 2019).

As defined by Rosson & Carroll (2009, p. 149): "...like any story, a scenario consists of a context, or state of affairs; one or more actors with personal motivations; knowledge; capabilities; and various tools and objects that the actors encounter and manipulate. The narrative describes a sequence of actions and events that lead to an outcome. These actions and events are related in a context of use that includes the goals, plans, and reactions of the people who are part of the episode."

The use of scenarios has potential application in many contexts, problems, issues, and when used in the classroom provides a useful means for students to approach the reality of their profession (Errington, 2011) by applying their knowledge and competences to solve issues in a safe environment (Erol et al., 2016). In this sense, students, as potential professionals, are confronted with a description of the scenario, where they should assume roles or certain specific perspectives to explore it in order to enrich and complement the application of their competence in a professional context. Notably, scenarios do not replace work immersion, but through them, there is the construction and deconstruction of authentic experiences (Errington, 2011).

A scenario-based assessment involves asking participants to answer questions or challenges related to a short case, where the assessment is supported by a scenario, several questions or challenges related to it, and a system for assigning scores (Daniel & Mazzurco, 2019). The application of case studies can be seen as an appropriate methodology for competences development, and in particular in preparing for the professional world of project management, because it allows the participant to apply the knowledge learned, enabling reflections of what went well, what went wrong, and what would be most recommended for improvement in the future (Kerzner, 2006).

According to Hagler & Wilson (2013), there is little research that develops guidelines for writing and using scenarios, also little has been found in the project management literature assessment models through scenarios. In general, scenarios should be able to require the participant to perform the competences being assessed and match the level of complexity of the actual task (Hagler & Wilson, 2013). However, before the competence can be assessed through the scenarios it is necessary to plan and develop processes, tools, and resources (Hagler & Wilson, 2013).

(O'Brien, Hagler, & Thompson, 2015) highlight a set of best practices that should be considered when developing scenarios for competence assessments, the first consists of a good theoretical foundation to identify the objectives or competences that are significant for the assessment, the second best practice refers to the selection of parameters for the scenarios, these parameters should be evidence-based, i.e., be grounded in practical guidelines that allow the simulation of real scenarios. The third best practice has to do with the link between the assessment elements, namely: the competences that are to be assessed, the instrument to be used in measuring the competence, and the scenario itself. Based on these best practices, the authors proposed an eight-step validation process for scenario design in simulation-based competence assessment.

First define the purpose of the proposed assessment (Step 1), then select a measurement instrument useful for the intended objectives (Step 2). In designing the scenario, a literature review is required (Step 3), then the scenario must be written and mapped (Step 4), the validation team must be selected (Step 5), and the method of conducting the validation process must be developed (Step 6). Finally, test the scenario (Step 7) and review and assess the feedback (Step 8) (O'Brien et al., 2015).

Given this, sought in this study, develop scenarios with real situations of project management, which were able to assess the people competences of professionals working in the area.

3. Methodology

The methodology of this study comprised six (6) steps for the process of developing, validating and assessing scenarios to assess on Project Management people competences. The steps of the study were adapted from the study by O'Brien et al., (2015). Table 1 shows the steps adapted for the study.

Table 2. Steps of the study

Steps (O'Brien et al., 2015)	Adapted steps (O'Brien et al., 2015)
1. Define the Purpose	1. Define the Purpose
2. Select the Tools 3. Review the Evidence	2. Review and selection of studies
4. Write and Map the Scenario	3. Development of scenarios 4. Review Linguistic of scenarios
5. Select a Validation Team 6. Seek Consensus	5. Validation of scenarios
7. Pilot the Scenario 8. Assess and revise	6. Pilot study

Step I. Define the Purpose: the purpose of developing scenarios is to integrate these scenarios into an assessment model of engineering project management competences (study under development). Assessment through scenarios is characterized as an approach that makes it possible to represent real situations or situations inspired in the professional reality of project management, thus, the purpose in developing scenarios is to assess project management competences.

Step II. Review and selection of studies: understanding and selection of studies was defined as the second phase, which aimed to search for general studies on scenarios, as it allowed identifying information, facts and evidence. This activity was developed searching the Scopus database. The end result of this phase was a general understanding of scenario-based learning in a variety of contexts. The authors (Wawak & Woźniak, 2020; Ilahi et al., 2014; Hagler & Wilson, 2013; Erol et al., 2016; Banerjee, 2019; Errington, 2011; O'Brien et al., 2015) were references in this phase for a general understanding about scenarios. It is important to mention that other studies contributed with less significance. However, we felt the need to deepen the analysis considering the engineering area. Following the procedures developed in the Scopus database, selecting only journals linked to the engineering area, resulting in 44 studies. Additionally, some works from the Project Management area of knowledge were also analysed: Kerzner (2006); PMI. (2017) A guide to the project management body of knowledge (PMBOK); IPMA/Individual Competence Baseline for Project Management (ICB4) and Miguel, A. (2019).

The Individual Competence Baseline for Project Management (ICB4) was the work selected as the fundamental work for this article. Defined as an International standard and developed by more than 150 experts on the subject, it presents a complete inventory of key individual competences for people working on projects. In this sense, it is characterized as a validated and complete instrument when seeking to develop and assess competences. It presents three domains of individual project management competences: perspective, practice and people competences.

For reasons related to time and capacity limitations it was decided to select the people competences domains, including the 10 (ten) people competences and the assessment criteria (indicators and performance measures), which will be used to describe and assess the scenarios.

Step III. Scenario development: for the development of the scenarios the 10 (ten) people competences described in the (ICB4) defined by the International Project Management Association (IPMA) were used in the study. In this sense, each scenario seeks to assess a specific Project Management competence, as an example: scenario 1 is based on the personal communication competence, scenario 2 is based on leadership and so on. Thus, each scenario assesses a base competence. Table 2 shows the scenarios that were developed in the study.

Table 3. Scenarios developed

Scenarios	Base Competence
1	Self-reflection and self-management
2	Personal integrity and reliability
3	Personal communication
4	Relationships and engagement
5	Leadership
6	Teamwork
7	Conflict and crisis
8	Resourcefulness
9	Negotiation
10	Result orientation

Step IV. Review with a Professional Social Science and Project Management Professional: the third phase of scenario development, comprised an in-depth review of the scenarios by two scholars, working in the fields of Educational Sciences and Project Management. The process aimed at two key inputs: (i) Linguistic review, and (ii) Review the content. Suggestions for improvement were analysed and the main improvements suggested were implemented.

Step V. **Validation with professionals:** whose objective focused on the collection of the first perceptions about the scenarios, problems that were exposed and actions for improvements with key informants. The key informants were professionals who work in the area of project management. Thus, for the selection of the professionals, two basic criteria was considered: professional experience linked to engineering projects and/or complementary training linked to the area of project management. With this in mind, a questionnaire survey was developed and sent via email, with open and closed questions; the questionnaire was created with 20 closed questions and 10 open questions. The closed-ended questions were answered using an agreement Likert-type scale, ranging from 1 to 5, represented qualitatively by the following perceptions: "1. totally disagree"; "2. disagree"; "3. neither agree nor disagree"; "4. agree"; "5. totally agree".
An invitation was sent, via e-mail, to 10 professionals, and we obtained the acceptance of all professionals. However, after sending the survey by questionnaire, a deadline of 30 days was offered, and at the end of the deadline, we obtained a total of 7 respondents. Table 3 presents a summary of the characterization of the profile of the professionals who were surveyed in this phase.

Table 4. Characterization of professionals

#	Basic Training	Training Additional	Experience in the area
1	Mechanical Engineering	Specialization in Project Management	5 years
2	Mechanical Engineering	Specialization in Project Management	1 years
3	Plastics Engineering	MBA in Project Management MBA in Careers, Leadership and Coaching	12 years
4	Business Administration	Professional Master's in Administration	10 years
5	Agronomic Engineering	Master's in Project Management	2 years
6	Production Engineering		6 years
7	Mechanical Engineering	Specialization in Project Management	10 years

The qualitative analyses of the survey results focus on the open-ended questions in the questionnaires. For each scenario presented, a question regarding suggested improvements was asked to the respondents. The quantitative analysis of the surveys went through statistical treatment which consisted of classification, calculation and analysis procedures. For this, the program SPSS (Statistical Package for the Social Sciences) version 26 was used. The analysis used was the calculation of Cronbach's Alpha coefficient.

Cronbach's Alpha coefficient is a technique used to assess the reliability and internal consistency of instruments. The objective in using the coefficient is to ensure the accuracy/reliability of what has been developed. In this sense, the coefficient measures the degree of reliability of the information obtained (constancy of the results and homogeneity of the items).

Step VI. Pilot study: with the scenarios statistically analysed from the standpoint of professionals in the field, the fifth phase of this study sought to apply the scenarios. To this effect, the scenarios were applied, and an assessment of project management competences was simulated by using scenarios. With this in mind, participants were sought who could contribute to the analysis of the scenarios. To this end, two criteria were defined: volunteers and students enrolled in the same academic year of the Integrated Master's Degree in Industrial Engineering and Management (MIEGI) of the University of Minho, Portugal. The objective in assessing these scenarios was to know the perceptions of the participants about the understanding, time estimation (reading and response), advantages and limitations identified in the scenarios and in the assessment of competences by scenarios.

In this sense, the pilot studies were organized in two groups of participants, with pilot study 1 being conducted online and pilot study 2 in person. It is important to mention that the choice of dividing the application of the scenarios into two groups of participants was an option of the authors due to the issue of the physical structure that could hold all the participants at the current moment (world pandemic). In pilot study 1, three participants were involved, and each participant answered one scenario: personal communication, leadership, and teamwork, and it was carried out in the month of December/2021. The second pilot contained three participants involved and the data collection process took place, face-to-face, in a room located at the University of Minho, exclusively for the process. For this group, seven scenarios were assessed: introspection and personal management, personal integrity, relationships and commitments, conflict and crisis, ingenuity, negotiation, and finally, results orientation. The pilot study was conducted in the month of March/2022. Figure 1 shows the main activities conducting the study I and II.

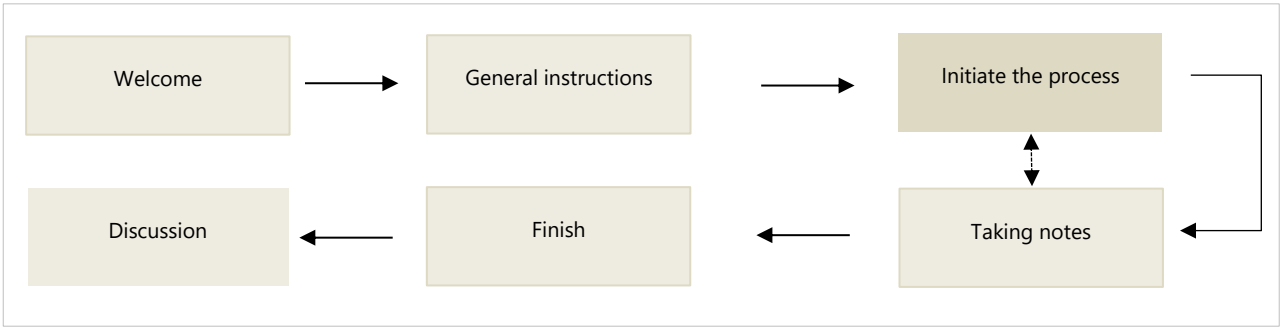

Figure 1. Activities Pilot Studies

In addition to the participants, an evaluator and a mediator were present in the studies. The assessor a professor with a doctorate and research focus on teaching and project management, with teaching experience in competence development and assessment, and the mediator was a professor with a focus on assessment studies of project management competences.

4. Development and Validation of scenarios

Developing scenarios for assessing Project Management people competences enables an assessment that mobilizes different resources, including knowledge, competences and experience in addressing a problem related to professional practice. Creating real or reality-inspired situations makes the assessment process "more flexible" and real in that one must mobilize different kinds of knowledge, not just memorization to deal with that problem situation. As an example, a question developed by the evaluator in some of the scenarios and which makes it possible to mobilize different resources: *"Have you been through a situation similar to this one (exposed in the scenario), either as a leader or as a team member? If yes, what actions did you take that you think could be useful for this scenario?* Each scenario developed reflects a practical project management situation and makes it possible to assess competences.

4.1 Analysis of Scenarios – a quantitative perspective

The professionals' contributions allowed to integrate a more realistic perspective to the scenarios. The result obtained indicated a value of the Coefficient Cronbach's Alpha, considering all dimensions, of 0.89, a value considered to be of almost perfect reliability, according to parameters used by (Landis & Koch, 1977). According to (Landis & Koch, 1977) the classification of the coefficient reliability follows the following limits: 0.81 to 1.0 almost perfect; 0.61 to 0.80 substantial; 0.41 to 0.60 moderate; 0.21 to 0.40 reasonable; 0 to 0.20 small.

For the data analysis of the questionnaire applied to the project management practice professionals for each scenario two closed questions and one open question were developed. The closed-ended questions were answered using an agreement Likert-type scale, ranging from 1 to 5, represented qualitatively by the following perceptions: "1. totally disagree"; "2. disagree"; "3. neither agree nor disagree"; "4. agree"; "5. totally agree".

Regarding the following question: "*Does the scenario represent a situation of Project Management professional practice?*". The data presented in Table 4 indicate that in the self-reflection and self-management and personal integrity and reliability scenarios 2 out of 7 of the respondents indicate that they do not agree with the representation of professional practice in the scenarios. In addition, the leadership and teamwork scenarios reveal some indecision on the part of respondents. In the other scenarios the results indicate agreement in the representation of the practical situation of project management.

Table 4. Answers from 7 professionals regarding the representation of professional practice situations

Scenarios	Base Competence	Totally disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Totally agree (5)
1	Self-reflection and self-management		2	1	2	2
2	Personal integrity and reliability		1		4	2
3	Personal communication			1	4	2
4	Relationships and engagement		2		3	2
5	Leadership			2	3	2
6	Teamwork		1	2	2	2
7	Conflict and crisis				3	4
8	Resourcefulness				3	4
9	Negotiation			1	2	4
10	Result orientation				4	3

Regarding the analysis of the second question "*Does the scenario provide the opportunity to demonstrate competence?*". In the personal communication scenario one expert indicated disagreement with the statement. In the scenarios, relationships and engagement, leadership, conflict and crisis and negotiation there was indecision by one expert. Finally, in the remaining scenarios, there was agreement on the scenario's opportunity to demonstrate the core competence. The results are shows in Table 5.

Table 5. Answers from 7 professionals regarding the opportunity to demonstrate the core competence

Scenarios	Base Competence	Totally disagree (1)	Disagree (2)	Neither agree nor disagree (3)	Agree (4)	Totally agree (5)
1	Self-reflection and self-management			2	4	1
2	Personal integrity and reliability				4	3
3	Personal communication		1		5	1
4	Relationships and engagement			1	3	3
5	Leadership			1	3	3
6	Teamwork				3	4
7	Conflict and crisis			1	3	3
8	Resourcefulness				4	3
9	Negotiation			1	2	4
10	Result orientation				4	3

4.1 Analysis of Scenarios – a qualitative perspective

The qualitative analysis of this study occurred in two moments: i) analysis of the improvements in the scenarios from the professionals' point of view, regarding the open question of the questionnaire; ii) analysis of the narratives of the pilot studies. The main results will be presented regarding the proposed improvements for the scenarios.

Regarding the Self-reflection and self-management scenario, professional 3, indicated:

> "Since it is an aid and/or recommendation to the colleague, it seems to me that what we will be able to extract from the interviewee, will be a transfer of best practices and experiences".

Regarding the communication scenario, two main propositions were evidenced:

> "...in previous moments the Project Manager had already mentioned that in situations like this it would be necessary to attend and consider procedures such as..." (professional 3).
>
> "Emphasize the importance of performing the activities according to the procedures, making it clear that, any problem should be communicated to the project manager" (professional 7).

For the leadership scenario:

> "It is necessary to include in the scenario the step that involves eventual attitudes thought and/or designed by the manager, to be taken or put into practice" (professional 3).
>
> "I think it is important to emphasize in the scenario that the "project manager" is hierarchically superior to the "construction coordinator". The nomenclature of the position, if misinterpreted, can distort the argumentation" (professional 4).

Regarding the teamwork scenario:

> "I would modify in the sense that the team leader is centralizing all the information and decision making, changing the context that he would be doing everything alone, but centralizing all the decisions with him" (professional 1).

As for the conflict and crisis scenario the inclusion of discordant points was suggested:

> "We could include the possibility of the Leader obtaining from the team, alternatives in points where there is no consensus" (professional 3).

For the negotiation scenario obtained the proposition:

> "I would include in the text not only that the "client may not be happy with the deviation" but also, more explicitly, that the client believed in the schedule and is already starting to have financial losses with this delay. This places on the interviewee a need to search for "arguments" more connected to the reality and practice of the business and how he would face the situation" (professional 3).

With the analysis of the results of the ten scenarios developed from the professionals' point of view the main suggestions were analyzed and included for the pilot studies. That said, the second part of this study, focused on the qualitative analysis of the pilot studies from the students' point of view. The objective in assessing these scenarios was to know the perceptions of the participants about the understanding, time estimation (reading and response), advantages and limitations identified in the scenarios and in the assessment of competences by scenarios.

Regarding the understanding/comprehension of the ten scenarios developed, all participants affirmed that there were no doubts. Furthermore, the data indicate that 100% affirmed that the time for reading the scenario, estimated at 2 minutes, was adequate. With regard to the time for answering the scenario estimated at 8 minutes, all respondents indicated that perhaps the time was too long and justified their response.

> "8 minutes is a very good time to discuss, but maybe 5 minutes is enough" (student 1).
>
> "In my opinion, a response time to the scenarios of 8 minutes is high since it is only one person talking, discussing about the best decision to make in a specific situation" (student 2).
>
> "Even with the additional comments and discussion with fellow observers, I think 8 minutes was too long for the scenarios" (student 3).

When asked about the main positive aspects of the experience of an assessment using scenarios, the results indicate that the respondents perceive positive points of an assessment by scenarios, allowing them to explain their arguments in an open and creative way in specific contexts of the area. Furthermore, they affirmed that the assessment that includes scenarios becomes diversified and representative and can be an important instrument for managers to present their competences. Below are some of the participants' descriptive answers.

> "It is an experience that allows candidates to explain their reasoning openly and allows for a very diverse and representative assessment" (student 1).
>
> "With the use of scenarios, it is possible for an evaluator to see, in a practical context, what a candidate's action would be in various situations, which is an advantage compared to the assessment only by competences mentioned in a curriculum, for example, and not effectively verified" (student 3).

When questioned with the difficulties felt in this assessment experience through the use of scenarios, two students directed to the lack of practical experience in the area, leading to difficulties in the argumentation in the answer.

> "Some lack of knowledge on how to deal with the content of some scenario. From the functional point of view of the method I had no difficulties" (student 1).
>
> "For me, the biggest difficulty in this experience was to put myself in the position of the project managers of the scenarios in which I was allocated and make the best decision. Another difficulty was in the argumentation of my decisions" (student 2).
>
> "The scarce experience in the labor market limited the answers to the scenarios to the use of teamwork experience only in the academic context" (student 3).

Finally, participants described in their own words their participation in the study. The responses indicate an enriching and valuable experience. Unanimously, they enjoyed and felt comfortable in assessment of this type. Below are some of the responses.

"I consider this a very enriching experience in that it allows candidates to try to develop their soft competences, such as thinking about various possible situations. From the assessment point of view, I think this is a very complete method, which allows us to make a very representative assessment of the candidates and has a lot of potential to be applied in several areas. I didn't know about it, and I really enjoyed the experience" (student 1).

"I liked participating in this experience, I think it was well thought out and structured. The different scenarios were interesting and their contents allowed for engaging discussions" (student 2).

"I found it a very interesting experience, which I had never been exposed to before and it seems like an excellent way to also prepare even students for the job market/job interviews" (student 3).

5. Discussion

In this study, it can be verified that the assessment of competences using scenarios (problem situations inspired by real situations of professional practice) was evidenced by the participants as an excellent possibility for the assessment of competences. The suggestions for improvement from the professionals' point of view sought to align the scenarios developed with the real situations of the professional practice of project management and also the perception of the demonstration of the competence

Several authors identified benefits of scenarios in assessment processes (Klassen et al., 2021; Lovell & Khatri, 2021; Naidu, 2010; Seddon, McDonald & Schmidt, 2012): increased motivation and interest, engaging process and learning and more effective assessment (Ribchester & Healey, 2019) emphasize the realistic factor, encourage reflection and promote individual responsibility.

In this study, some of the benefits were evidenced. Benefits such as a dynamic and interactive, diversified and representative assessment, with the possibility of explaining the reasoning in an open manner and also aligned with professional practices of project management made the assessment approach by scenarios a possibility to assess people competences, since the assessed could mobilize different resources in solving a problem situation that is presented by the scenario.

Still, the assessment of competences by scenarios can be useful for accreditation, recruitment and team building processes, as it allows mobilizing different types of competences in simulated situations close to professional practice, diversifying the competence assessment processes and allowing the assessed a more flexible and real situation.

6. Conclusion

The objective of the study was to develop project management scenarios for assessing people competences. The importance of assessing these competences in the Project Management area is undeniable, and in this sense, assessment through scenarios becomes an excellent way to prepare professionals effectively for their practice.

The main results of the study indicate that the ten scenarios developed and assessed present benefits and provide the participant with the mobilization of resources, competences and experience to solve the problem to which he/she was exposed. In addition, the statistical analysis show high level of agreement from the point of view of professionals regarding the representation of project management practices, but show allow the need for review of some of the scenarios before the application in assessment processes.

As future work, scenarios will be improved, and instruments to support the assessment process will also be developed, i.e. rubrics for competence assessment will be developed for all people competences scenarios. With the scenarios and rubrics for competence assessment, a model for assessing Project Management people competences will be developed tested.

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References

Alam, M., Gale, A., Brown, M., & Kidd, C. (2008). The development and delivery of an industry led project management professional development programme: A case study in project management education and success management. *International Journal of Project Management*, 26(3), 223-237.

Banerjee, H. T. L. (2019). *Investigating the construct of topical knowledge in a scenario-based assessment designed to simulate real-life second language use*. Teachers College, Columbia University.

Crawford, L. (2005). Senior management perceptions of project management competence. *International journal of project management, 23*(1), 7-16.

Daniel, S., & Mazzurco, A. (2020). Development of a scenario-based instrument to assess co-design expertise in humanitarian engineering. *European Journal of Engineering Education*, *45*(5), 654-674.

Erol, S., Jäger, A., Hold, P., Ott, K., & Sihn, W. (2016). Tangible Industry 4.0: a scenario-based approach to learning for the future of production. *Procedia CiRp, 54*, 13-18.

Errington, E. P. (2010). Preparing graduates for the professions: achieving employability through the exploration of near-world scenarios. *International Journal of Interdisciplinary Social Sciences*, *5*, 1-10.

Errington, E. P. (2011). Mission possible: Using near-world scenarios to prepare graduates for the professions. *International Journal of Teaching and Learning in Higher Education*, *23*, 84-91.

Hagler, D., & Wilson, R. (2013). Designing nursing staff competency assessment using simulation. *Journal of Radiology Nursing*, *32*(4), 165-169.

Ilahi, M., Cheniti-Belcadhi, L., & Braham, R. (2014, July). Scenario model for competence-based assessment. In *2014 IEEE 14th International Conference on Advanced Learning Technologies* (pp. 344-346). IEEE.

IPMA. (2015). Referencial de Competências Individuais para Gestão de Projetos, Programas e Portefólios. International Project Management Association.

Klassen, R. M., Rushby, J. V., Maxwell, L., Durksen, T. L., Sheridan, L., & Bardach, L. (2021). The development and testing of an online scenario-based learning activity to prepare preservice teachers for teaching placements. *Teaching and Teacher Education, 104*, 103385.

Kerzner, H. R. (2006). *Project Management: With Project Management Case Studies, 2r. e*. John Wiley & Sons.

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of chiropractic medicine, 15*(2), 155-163.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *biometrics*, 159-174.

López-Alcarria, A., Olivares-Vicente, A., & Poza-Vilches, F. (2019). A systematic review of the use of agile methodologies in education to foster sustainability competences. *Sustainability, 11*(10), 2915.

Lovell, D., & Khatri, C. (2021). Do Early Simulations Work? Simulations in Gateway Political Science Courses at Community Colleges. *Journal of Political Science Education, 17*(1), 139-148.

Miguel, A. Modern Project Management: Best Techniques and Practices. 8th Edition. FCA.

Naidu, S. (2010). Using scenario-based learning to promote situated learning and develop professional knowledge. In *Preparing graduates for the professions using scenario-based learning* (pp. 39-49): Post Pressed.

O'Brien, J. E., Hagler, D., & Thompson, M. S. (2015). Designing simulation scenarios to support performance assessment validity. *The Journal of Continuing Education in Nursing, 46*(11), 492-498.

PMI (2017). A guide to the project management body of knowledge (PMBOK® Guide) (Sixth edit). Project Management Institute, Inc.

Ribchester, C., & Healey, R. L. (2019). Realism, reflection and responsibility: The challenge of writing effective scenarios to support the development of ethical thinking skills. *Journal of Further and Higher Education, 43*(1), 101-114.

Rosson, M. B., & Carroll, J. M. (2009). Scenario based design. *Human-computer interaction. boca raton, FL*, 145-162.

Seddon, J. M., McDonald, B., & Schmidt, A. L. (2012). ICT-supported, scenario-based learning in preclinical veterinary science education: Quantifying learning outcomes and facilitating the novice-expert transition. *Australasian Journal of Educational Technology, 28*(2).

Vukomanović, M., Young, M., & Huynink, S. (2016). IPMA ICB 4.0—A global standard for project, programme and portfolio management competences. *International journal of project management, 34*(8), 1703-1705.

Wawak, S., & Woźniak, K. (2020). Evolution of project management studies in the XXI century. *International Journal of Managing Projects in Business*, *13*(4), 867-888.

Waxman, K. T., & Telles, C. L. (2009). The use of Benner's framework in high-fidelity simulation faculty development: The Bay Area Simulation Collaborative model. *Clinical Simulation in Nursing*, *5*(6), e231-e235.