Accelium

CURRENT STATUS ABOUT GAME-BASED ASSESSMENT

Accelium presents a framework for the measurement of knowledge, skills, abilities, and other human characteristics using smart games.

January 2025

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CEO's Opening Remarks

“Which tool is stronger, Bishop, or knight?" One of the first questions I asked my chess teacher as a child. This is a tricky question, both tools move on the board in a completely different way, and at the same time, they are considered equal in their power. Each of them is worth three points. How do you know which is better? Bishop, or knight?

The chess teacher replied: "It depends on the position; in open positions, the Bishops are better because their range of motion is big, and in closed positions, the knights are stronger because their maneuverability is greater." "It's like with people," he added, "it depends on the position." Of course, I did not fully understand what he meant. I was young and preferred to focus on the board's boundaries and what's inside them rather than looking for insights outside of it.

To me, the world of human resources is becoming more and more similar to Chess. We already understand that people have abilities appropriate for the board's position, the cooperation with other people, and the need for the game. We are looking for hidden talents, adaptability to the organization's spirit, adaptation to the needs of the project. We are looking for abilities, skills, behaviors, and not necessarily accreditations and certifications.

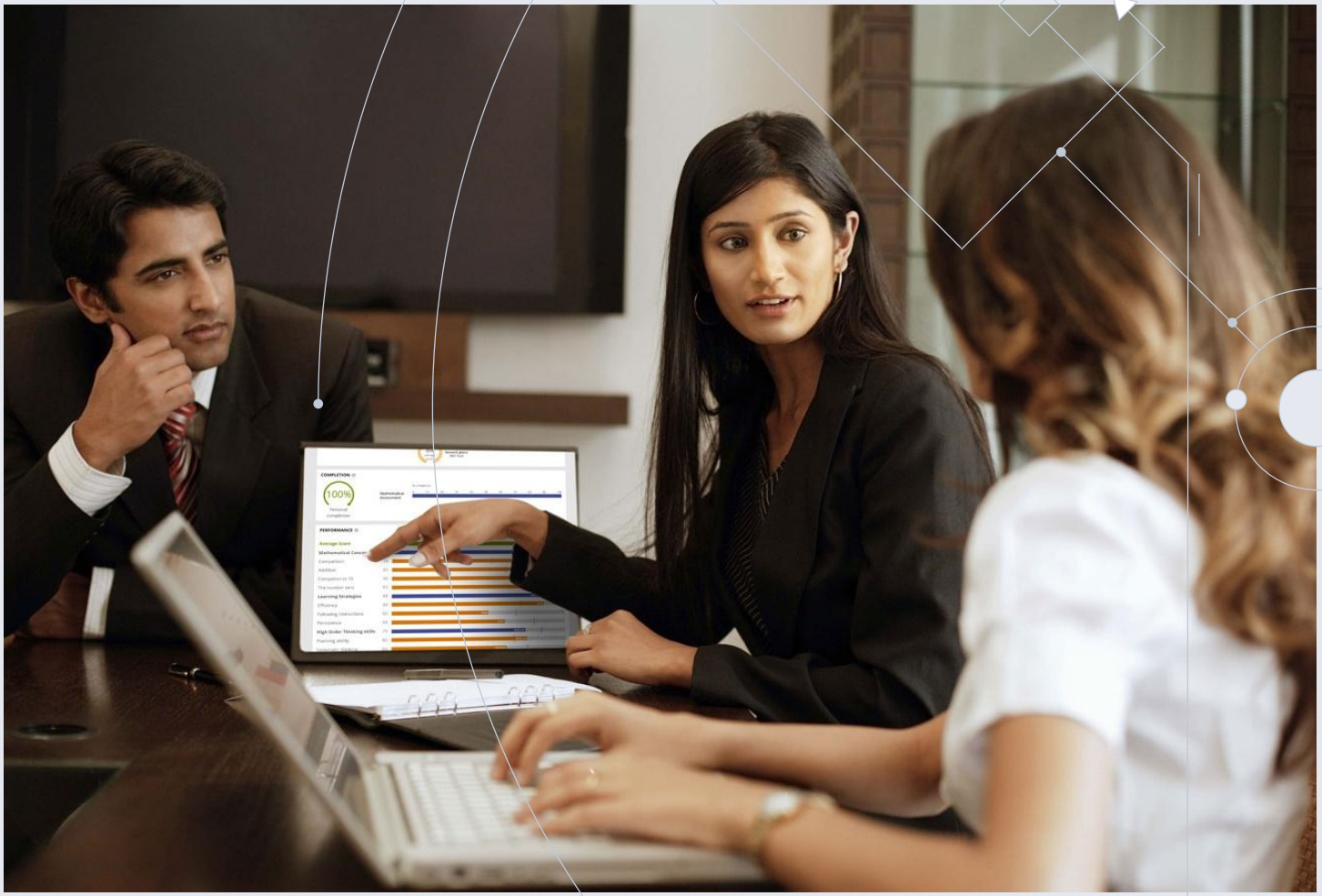
A penetrating view at the candidates' thinking patterns, gaining insights related to their learning style, their ability to endure pressure, their level of understanding of the situation. All of which have become more important in our time.

Another important trend is, of course, the technological trend. In recent years we have witnessed a digital revolution in many service areas of our lives. Many traditional areas such as insurance, health, transportation, hospitality, shopping, and more have undergone a shake-up and change following the coming of advanced digital services. The evaluation field is also undergoing a rapid change in the digital direction. More and more organizations are looking to lower costs, simplify processes, and get more information with less effort. The new habits of all of us, especially the younger generation, require a faster pace, a different and more accessible experience. The rapid changes in the labor market require other skills, which must be assessed and developed. The global epidemic has further accelerated the digital processes, and what is considered advanced and exciting has become necessary due to the epidemic's constraints. As a global company specializing in developing and evaluating thinking skills, we see a growing demand for game-based assessment products. Since this is a new and fascinating trend, which is intriguing to many intellectually and practically, we decided to gather data, research, and answers on the subject for you.

This status document comes to give up-to-date information from the last three years, in which we operate our solutions in the market. We hope that we will contribute to your knowledge and that this document will contribute to the Game-based assessment development and promotion.

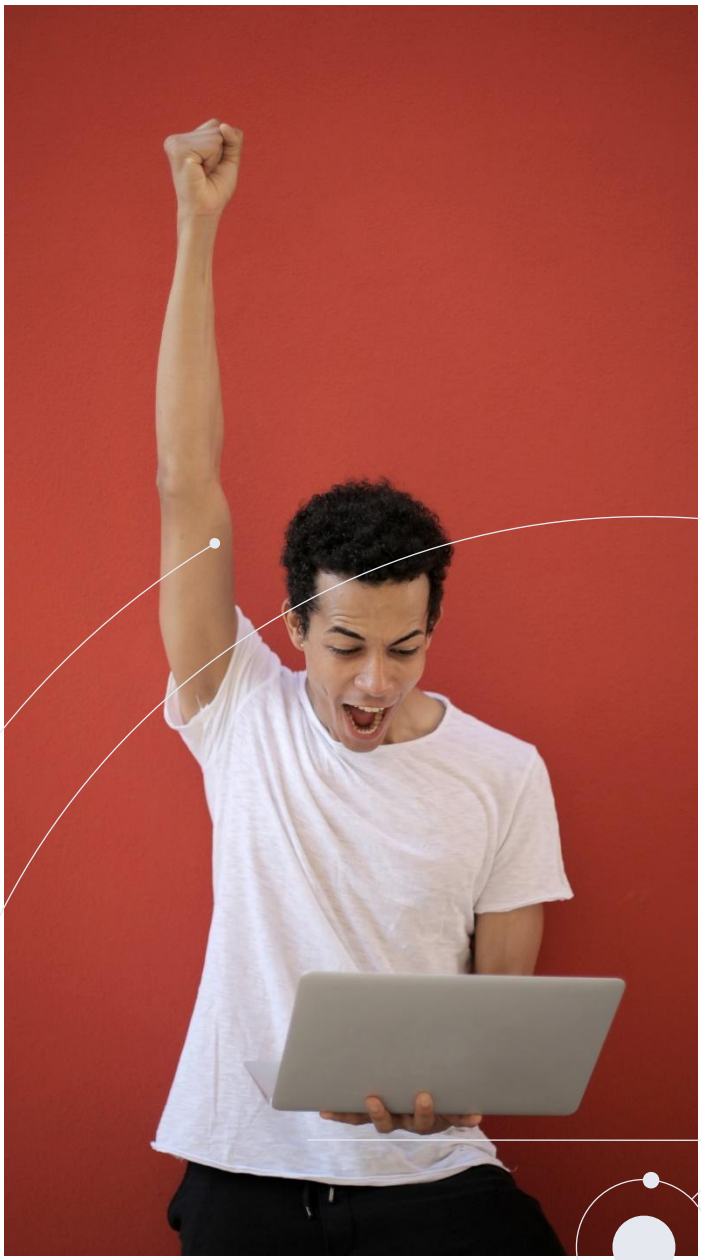
Chapter A: Introduction

There is a growing interest in the use of Game-Based Assessment to measure skills performance. This chapter will provide an initial introduction to game-based assessment technology.



1. What is a game-based assessment?

There's a lot of buzz around game-based assessments as a way to evaluate employees and candidates in hiring or in promotion process. Game-based assessments are enticing because they seek to turn something that can be stressful and tedious into something fun and engaging. It's clear that game-based assessments can add a ton of value to the candidate evaluation process, and we believe they represent a promising new frontier. Let's dig into what game-based assessments are and how we see them positioned in the corporate and education landscape.



First, what is a game?

Games typically have several qualities in common. First, they're fun. Of course, "fun" can be subjective from person to person, but the intention is for the assessment to have that element of game-like fun to it. Without that, it's just a typical assessment.

Second,

games involve a set of rules that define the gameplay.

Third,

the player typically gets to make a series of decisions within the bounds of a defined set of rules. These decisions are oriented around achieving a goal, whether that goal is to beat other players or to get the most points.

And fourth,

the game typically results in some sort of measurable outcome, which is typically expressed as your score, or whether you win or lose.

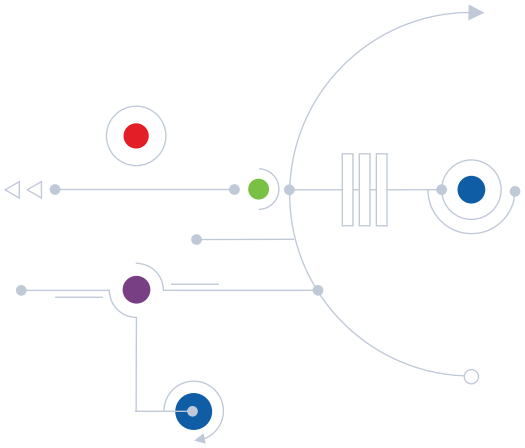
Game-based assessment (GBA) is the application of principles of game design to measure human performance.

Game-based assessments balance two very significant needs. The first need is to identify the skills and abilities that will ultimately predict how an employee or a candidate perform in the job. Employers want more predictive information on the likelihood that their candidates will succeed, and validated assessments are a great way to achieve this.

But the need for this information is balanced by a second need - the need to maintain a positive candidate experience that respects your candidates' time and investment in the process. In a candidate-driven job market, candidate experience is more important than ever, and companies are rightfully concerned about appealing to their candidates.

Game-based assessments have emerged as a way to balance the need for predictive information on your candidates with a fun and engaging experience.

2. What are the benefits of game-based Assessment?



Attraction! Positive Experience and Highly Engaging

- Fun, interesting game-playing test
- Positive differentiation - reflects an innovative, people-oriented brand identity
- No need for long, tiresome questionnaires

Streamlined Assessment Process

- Fast testing
- Produces a rich, concise report including skills assessment and identification of strengths
- In-depth and multidimensional analysis - based on the identification of behaviors and thinking patterns

No prior knowledge required

- No need for preliminary instruction
- Game rules are learned during the test

Maximum flexibility

- No monitor presence required
- Applicants can be tested in the comfort of their own homes
- Supports multiple concurrent test-takers

Enhances Employment Brand

- Leave a lasting positive impression on applicants
- Convey a fresh and dynamic employer image
- Creates an important competitive edge for companies in an increasingly global war for talent

3. For what ends will we use a game-based assessment?

Perhaps the most important aspect of game-based Assessment is its potential to measure the higher-order skills essential for success in so many walks of life. This what makes the Game-Based Assessment relevant to various segments in the population and for different purposes.

For Recruitment

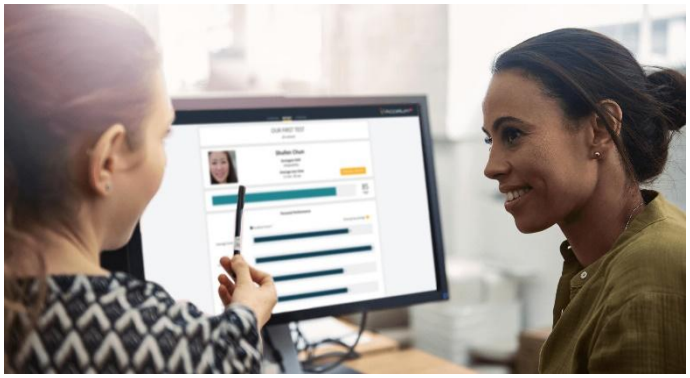
Game based assessment makes recruitment process more effective and efficient for employers. It enables to test employees' and job applicants' skills in a fast, engaging and effective way, providing exclusive insights on the most critical skills for success.

For Business Coaches

Whether they are training individuals or an entire organization, game-based skill-development programs give coaches an innovative way to build critical skills such as Analysis, Planning, Flexible Thinking, and Resilience.

For Executive Courses

Game-based Executive Courses allow key managers and employees to build critical skills in an engaging, cost-effective way across organizations.



Employee Evaluation

Game-based Assessment utilizes artificial intelligence tools to identify employee thinking patterns and characterize their decision-making style, focus over time, methodicalness, learning curve, etc. Resulting insights improve personal awareness and can help define a focused personal growth and career plans.

Educational Systems

Game-based learning and assessment are a great tool that helps to modernize learning and education. It keeps students engaged and make sure they are learning how to be critical, confident, and creative; all are abilities they'll need for success in the future.

Universities

The formative nature of game-based learning and assessments permits students, through applying and practicing the targeted knowledge and skills during gameplay, to gain experiences, receive immediate feedback, and as a result, improve their skill mastery.

4. What is the difference between game-based and traditional assessments?

While it's rather obvious that playing a fun digital game is more exciting and less stressful for candidates and can lower the guard of candidates to answer more truthfully, what's in it for the employers using these tools?

Routinely, companies examine their candidates via interviews on their academic achievements and past professional experience; occasionally combining the latter with Psychometric tests. One of the problems employers are facing when applying the traditional evaluation tactics alone is the subjectivity level and inability to determine candidates' soft skills. Not to mention the biases that predetermine our choices and impressions.

It is proven that companies applying a combination of several selection practices end up generating greater productivity and increased sales per employee. Here is where the game-based assessments come into the fray. The use of games for HR purposes helps to recreate real-world situations and true candidate reactions; disclosing their soft skills (i.e. adaptability, flexibility, resilience, decision-making etc.) which are difficult to ascertain from traditional multiple-answer tests or interviews.

Professionals state that "unconscious biases have a critical and problematic effect on our judgment, leading to making decisions in favor of one person to the detriment of others".

Here is a short review of the advantages of game-based assessment versus the disadvantages of traditional assessment tools.

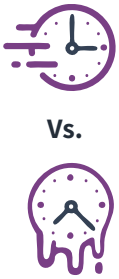
Time-consuming: possibility to screen more people in less time

Reliable and Objective results

Easy - applicable

Engaging for Candidates

Capture hidden behaviors



#1 Time-consuming: allow to screen more people in less time

Game-based assessments don't require the presence of an interpreter, moreover, they do not even require the candidate to be in the same country. Instead of spending a day for conducting interviews, recruiters are able to devote their time analyzing the results and then making a hiring decision. This approach also motivates recruiters to assess a larger amount of candidate profiles, than they would have if running traditional interviews, allowing them to cherry pick the best profile.

#2 Reliable and objective results

Another difference between game-based and psychometric tests in the traditional methods is that during the game, candidates can hardly fake their reactions; what they would normally do when asked directly. This provides recruiters with a rather powerful, factual, objective and unbiased ability to evaluate candidates' fit for the position. The game-based assessment analytical report is available to the recruiter upon completion of the test; illustrating the potential hires' strengths and areas of improvement, enabling them to shortlist candidates and hire the best person for the job. Due to the human factor elimination, game-based assessment also reduces discriminatory judgments such as gender or ethnicity, providing a unique opportunity for fair comparison for every candidate. In turn, this adds credibility to the company's employers' brand, representing the company as an innovator; providing a base for top talent attraction.

#3 Easy - applicable

Game-based assessment focuses on the evaluation of soft skills and of cognitive aptitude, which are necessary and are applicable across all the industries and position levels, regardless the seniority. Additionally, there is no difference whether the candidate is an "experienced gamer" or not. Game based assessment are self-explanatory and offer each candidate a unique experience. Furthermore, companies of all sizes can gain from game-based tests.

#4 Engaging for Candidates

Game based assessment is significantly more engaging than a traditional psychometric exam. Candidates are generally more likely to complete a short series of games than a lengthy test and are more likely to enjoy the experience.

#5 Capture hidden behaviors

Game-based assessment can be used for the summative evaluation. Still, its natural strength is monitoring performance by assessing the information trails that examinees naturally leave behind when playing a game: that information trail can consist of four types of observations: time to respond, the accuracy of answers, points earned, number of attempts, and more. Traditional tests will not be able to calculate these criteria.

5. What prompted the use of game-based assessment?

Corporate recruiting and training are facing significant challenges. Employees are no longer engaging with traditional forms of recruiting, training, and assessment, finding the whole experience 'unexciting' and 'boring'. Compounding this situation is the growing number of 'millennials' entering the workforce. Millennials are the largest generation in the world labor force since 2015.

By 2025, Millennials are going to make 75% of the global workforce. Millennials (also known as Generation Y) are the generational demographic group of people born between 1980 and 1995. The older Generation Z members are now entering their final year of college, and they will soon be entering the job market. Millennials have come of age during a time of technological change, globalization, and economic disruption. That's given them a different set of behaviors and experiences than their parents.

Gallup report from 2017 states that Millennials have grown up with the internet and smartphones. This new generation is highly educated, tech-savvy, entrepreneurial, self-aware, and confident. These demographics have made it necessary for businesses to engage with emerging talent in new ways to secure their company's future.

The generations defined

Post-Millennial generation
Born: 1997 and later
Age of working-age adults in 2017: 16 to20

Millennial generation
Born: 19Slto 1996
Age in 2017: 21 to 36

Generation X
Born: 1965 to 1980
Age in 2017: 37 to 52

Baby Boom generation
Born: 1946 to 1964
Age in 2017: 53 to 71

Silent and Greatest generations
Born: 1945 or earlier
Age in 2017: 72 and older

PEW RESEARCH CENTER

Chapter B: Research

As game-based assessment becomes more popular, so does the academic debate surround the use of the tool. In recent years there have been more and more studies on the subject. In this chapter, we will review several relevant research topics

1. Can game-based assessments able to predict real-life performance?

Game-based learning and Game Based Assessment are two areas of research that have attracted attention in recent years within the global trend of educational and corporate technology research, recognized as important subjects for study that will become increasingly popular in the next few years. This chapter outlines few researches in both game-based learning and game-based assessment, and tries to answer the question: are the game-based assessments any good? Are they actually able to predict job performance?

The Impact of games-based learning on learning outcomes

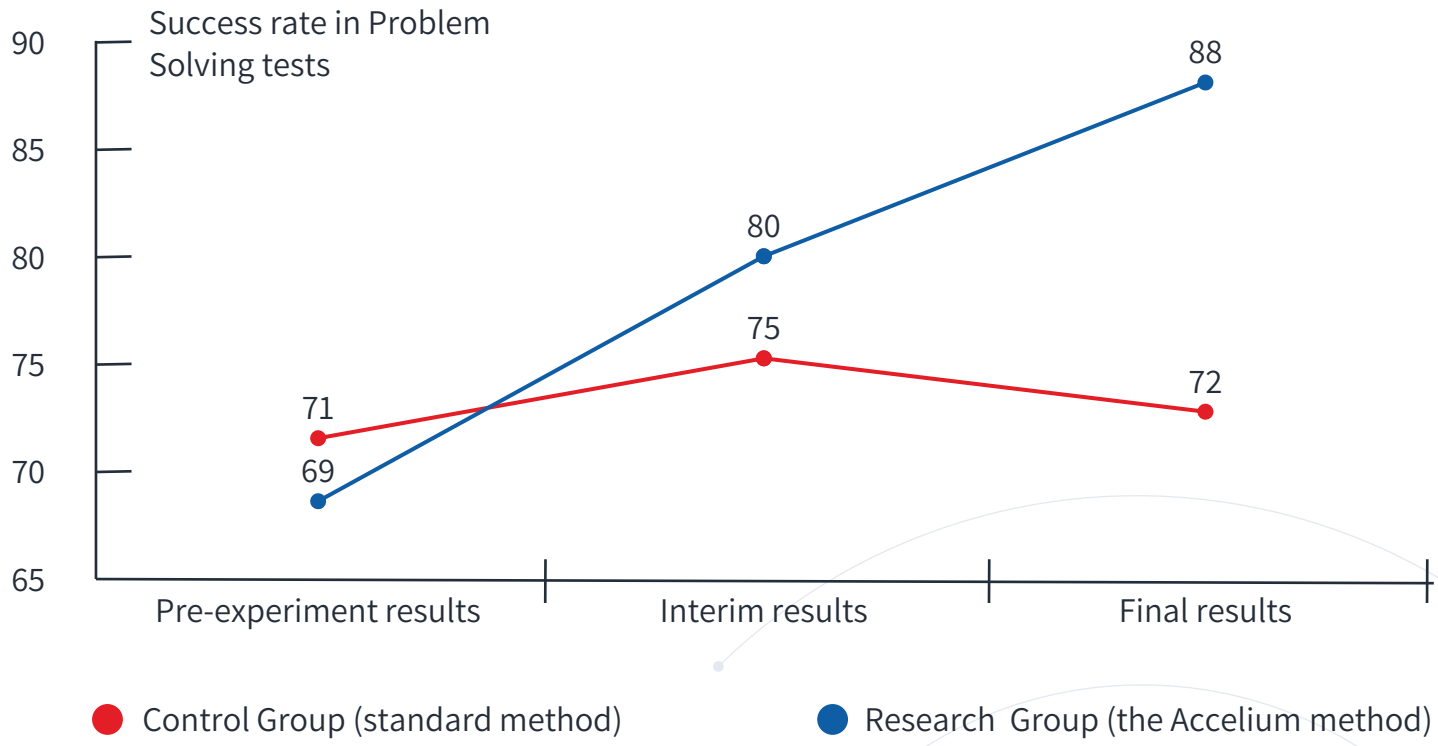
The efficiency of using games in learning and training has been tested in several comparative research projects, most notably that of Professor Donald Green of Columbia University. The different projects confirm that proper use of thinking games under orderly and systematic methodology can significantly improve learners' thinking abilities and life skills. One project tested the hypothesis that children can be taught abstract strategic thinking by learning meta-cognitive models and by being exposed to the applications of these models in strategy games and in real-life situations. The study included children ages 8-12, from diverse socio-economic backgrounds.

Professor Donald Green

In the first stage, all children played an online “puzzle” game. Their game performance and progress were monitored. In the second stage, children in the research group were taught abstract models for problem-solving, and their analogies to real-life situations.

They were then shown how to apply these models in the games. The children in the control group simply participated freely in game-playing sessions. In the third stage, all children were taught a new game. Both groups received identical instruction.

The Accelium Method & Problem Solving



Summary:

- The Children in the research group significantly improved their performance levels comparing to the control group, even though the latter were allocated more time in their game-playing sessions.
- The remarkable fact is that even in Stage Three, the research group achieved notably higher results. In fact, the disparity between the two groups actually increased between Stages Two and Three.
- There is a close connection between how students performed in the game and how they perform in school related tasks.

For further reading: *Green, Donald P., and Dan Gendelman. (2003). Teaching Children to Think Strategically: Results from a Randomized Experiment. Unpublished manuscript, Institution for Social and Policy Studies at Yale University.*

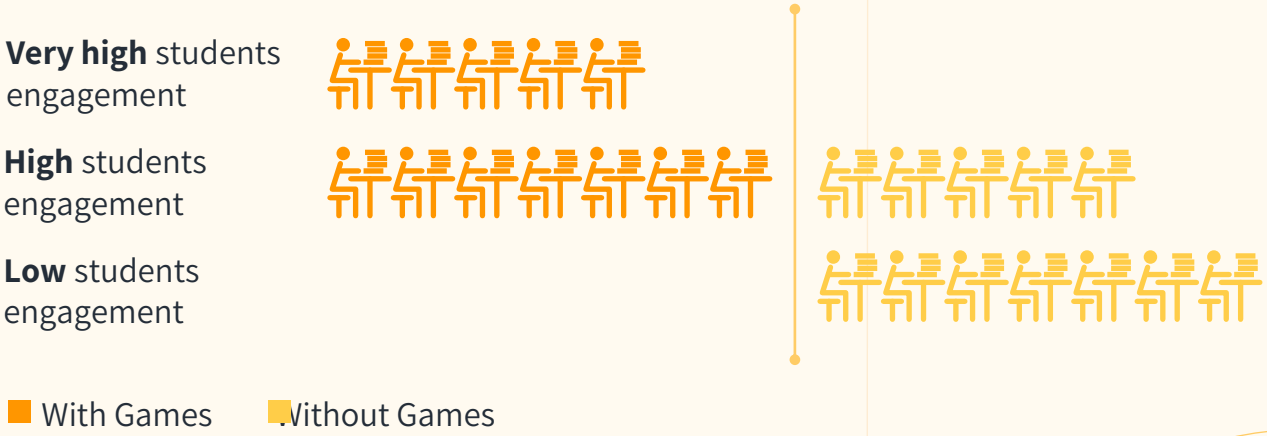
Green, Donald P., and Dan Gendelman. (2004). Can a Curriculum that Teaches Abstract Reasoning Skills Improve Standardized Test Scores? Unpublished manuscript, Institution for Social and Policy Studies at Yale University.

The Impact of games-based learning on learning outcomes

A soon-to-be-released study called "Substantial Integration of Game-based learning into schools Curricula," Vanderbilt University in the US had remarkable findings. They measured the impact of using game-based learning tools on students' engagement and school achievements. The research found that the students who played the digital games outperformed their peers on standardized tests. Additionally, teachers saw dramatic increases in engagement and performance. The sample size was large enough—more than 1,000 students in seven states and schools with differing student bodies, socioeconomic factors, and geographical locations.

VANDERBILT UNIVERSITY

Teacher's reported dramatic increases in engagement amongst students who participated in the game based learning.



For further reading: *Substantial Integration of Typical Educational Games into Extended Curricula, Journal of the Learning Sciences, May 2019 edition.*

Game based assessment in corporate training and recruitment

Digital games also provide employees with opportunities to fail, learn from their mistakes, and try again in safe environments.

While Don Greens' study have been carried out in educational settings, there have also been studies relating to the effectiveness of game-based learning for corporate training.

In 2012, the Learnovate centre, a European research and innovation center focused on EdTech and learning technologies, published a comprehensive review of the research evidence for the effectiveness of serious games for corporate training. Learnovate center has listed three key processes in organizations in which games are being used: training, recruitment and marketing and sales. The use of digital games for corporate training and development across many subject domains are increasingly being recognized.

LEARNOVATE

Large organizations such as IBM, Cisco, and Deloitte are increasingly using games to train their workforces in areas ranging from compliance training to leadership training. These organizations recognize that new employees are not engaged and motivated by traditional training forms due to exposure to new and exciting technologies in their everyday lives (including page-turning, linear eLearning), resulting in a poorly trained workforce.

Their review showed that there is an increasing body of empirical research to support the effectiveness of games-based learning. They found research evidence for improvements in attitudes, engagement and motivation. They brought evidence for improved cognitive gains when compared to conventional instructional methods. Furthermore, according to their review, there is research evidence demonstrating positive impact on higher order skills such as Decision Making and Problem Solving.

Game-based assessments are an exciting frontier in recruitment testing because they combine the best of both worlds - a scientifically validated assessment delivered through a candidate-friendly experience.

Learnovate center emphasized the use of digital games in recruitment testing. Pre-employment game-based tests provide an objective and predictive measure of how likely a candidate is to succeed on the job. Assessments are designed to provide employers with an additional layer of objective information to make more informed hiring decisions.

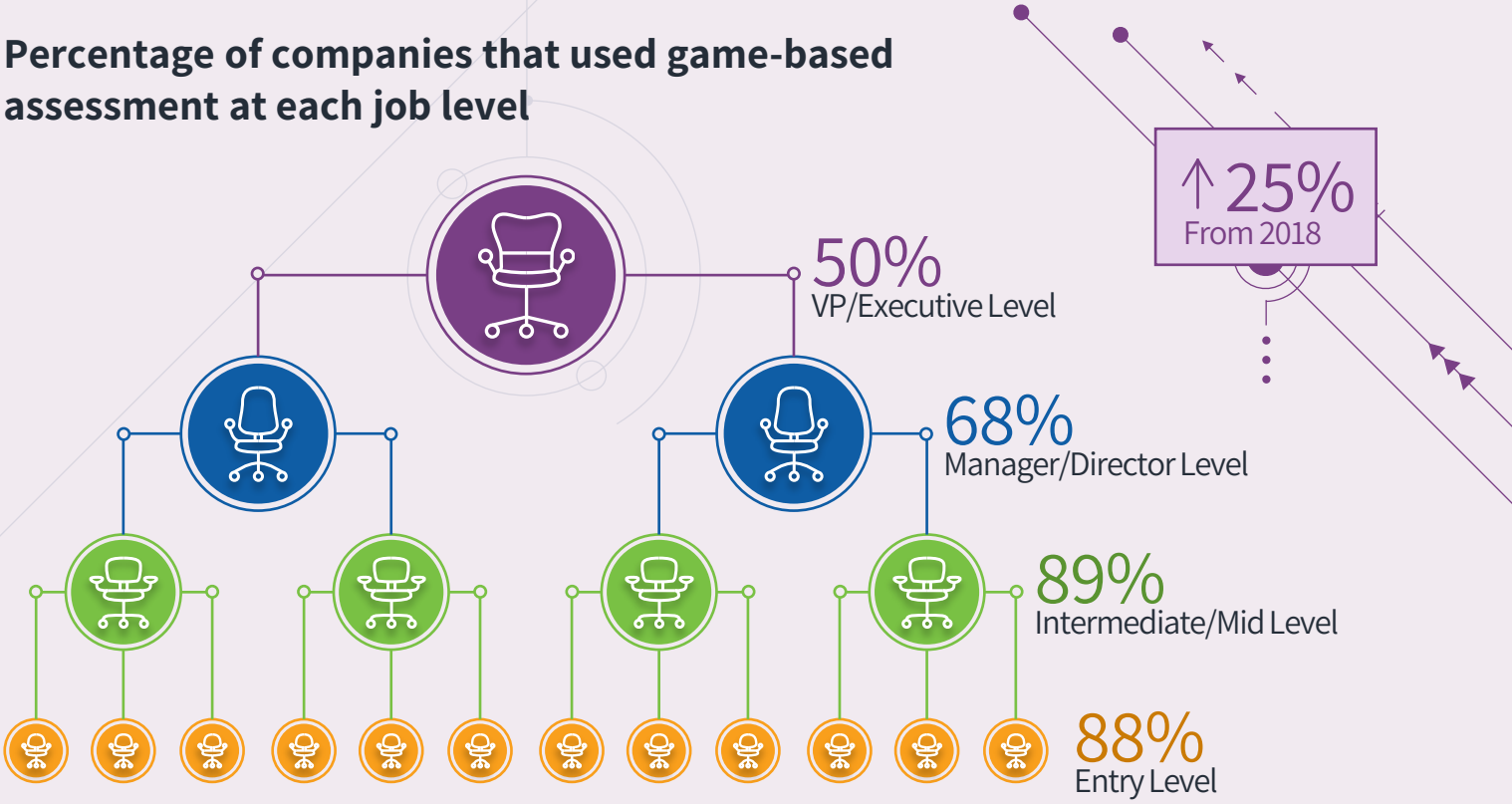
In 2019 Learnovate center held a survey with more than 200 hiring professionals across a wide range of industries to gain a better understanding of how they hire and the ways they incorporate game-based assessments into their hiring process.
The results showed that the majority of respondents use game-based assessments to assess entry and mid-level candidates.

88% use it for entry-level candidates, while 89% use it for intermediate or mid-level candidates. This isn't too surprising. As we mentioned earlier, many organizations use game-based assessments to filter through large pools of candidates.

The report stated that when moving up to higher job levels, the usage goes down. Just 68% of companies give game-based assessments to manager or director level candidates, and just 50% are giving them to VP or executive level candidates.

This pattern is not surprising. When an organization defines an upper-level role that requires a great deal of experience and knowledge, it is more likely to get fewer applicants overall than entry and mid-level candidates.

Percentage of companies that used game-based assessment at each job level



For further reading: *Donovan, L. (2012 and 2019). The use of serious games in the corporate sector. Learnovate Centre Ireland. Available at: https://www.learnovatecentre.org/wp-content/uploads/2013/06/Use of Serious Games in the Corporate Sector PRINT FINAL.pdf (Accessed July 2020)*

2. Which skills can be examined using a game-based assessment?

Along with the increasing use of games for learning, there is also a growing development and research around skills assessment.

In 2015, the Education Policy Committee of the OECD launched the OECD Future of Education and Skills 2030 project as an opportunity to step back, explore the longer-term challenges facing education, and help make the process of curriculum design and development more evidence-based and systematic.

The project aims to help countries find answers to two far-reaching questions:

1. What knowledge, skills, attitudes, and values will today's students need to thrive in and shape their world?
2. How can instructional systems develop these knowledge, skills, attitudes, and values effectively?

As one response to these questions, the OECD Future of Education and Skills 2030 project, developed the OECD Learning Compass, its an evolving learning framework that sets out an aspirational vision of education in 2030. It provides points of orientation towards the future we want.

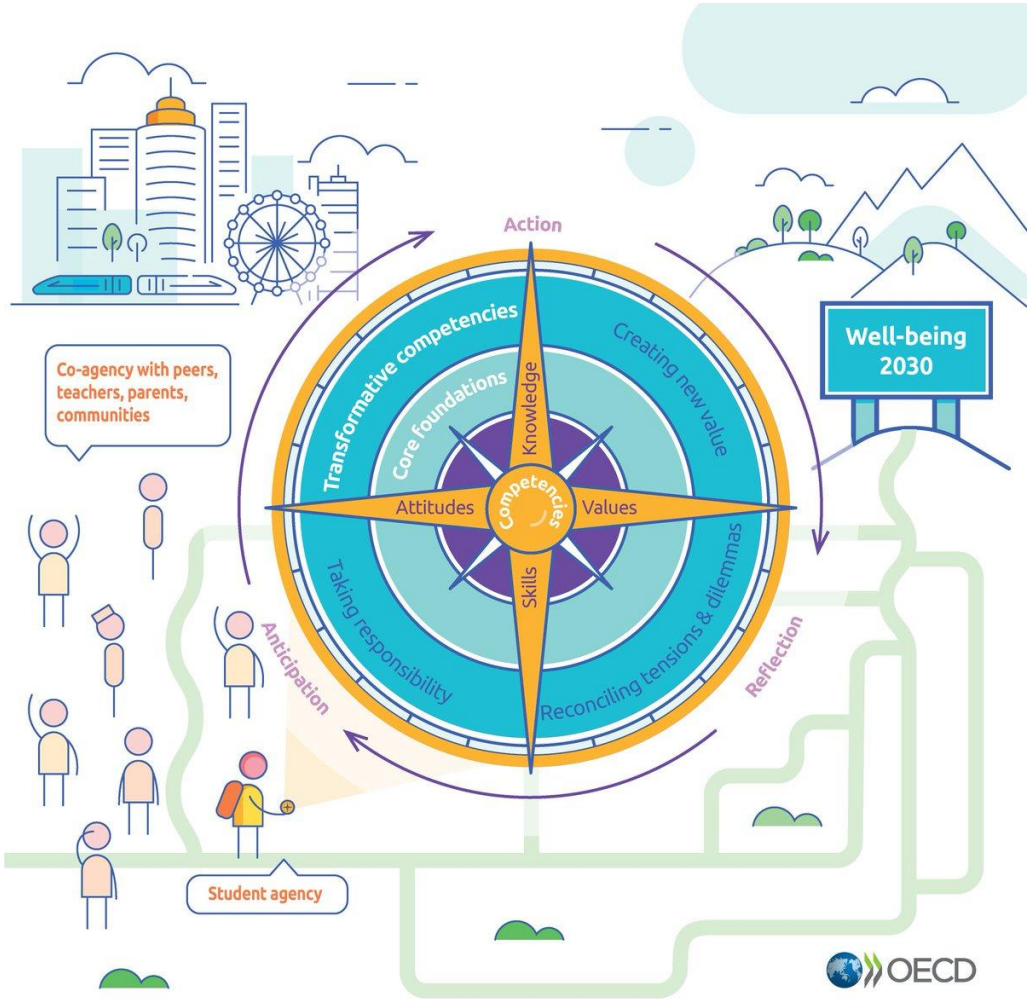
The document describes with great accuracy the skills that school graduates will need to integrate into the world of work: "*The critical skills that graduates of the education system need to successfully cope with the challenges they expect in adulthood (in the 21st century) are high-order, cross-disciplinary thinking skills. These skills are characterized by non-algorithmic thinking, unclear and predefined thinking patterns, multiple criteria, multiple ideas/hypotheses/solutions…"*

The paper also calls for education systems to keep pace with changing times:
"Emerging evidence on how to optimize learning, including the use of technological innovations to deepen and transform learning; and changing expectations on the part of learners, who are demanding an education system that is more connected and relevant to their everyday lives."

Summary:

As computer technologies have displaced labor in routine tasks, they have also created new employment opportunities for workers with non-routine cognitive skills, such as creativity, and social and emotional skills.

To remain competitive, workers will need to acquire new skills continually, which requires flexibility, a positive attitude towards lifelong learning and curiosity.



For further reading: *OECD Future of Education and Skills 2030, Conceptual learning Framework, Learning Compass 2030*

More than half of executives admit their employees are "average" at best in critical thinking, creativity, collaboration, and communication skills.

According to a new survey conducted by the American Management Association (AMA), more than half of executives say there is significant room for improvement in their employees' competencies. Most respondents admit that their employees are average, at best, in the critical four C's areas (critical thinking, communication, collaboration and creativity) - a distressing situation, since three out of four managers and executives surveyed say these skills will become ever more critical in the near future. (Figure 1)

How do you believe your organization will view these skills and competencies (critical thinking, communication skills, collaboration, and creativity) in the next three to five years?

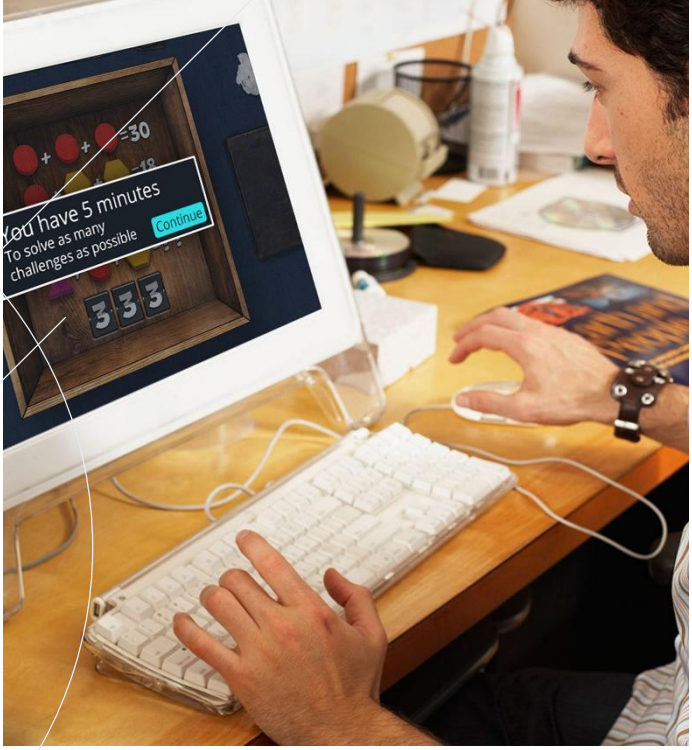
They will become less important	1.4%
They will remain the same	21.4%
They will become more important	74.6%
No opinion	2.6%

In December, AMA conducted the 2012 Critical Skills Survey, asking 768 managers and other executives about the importance of the four C's skills to their organizations. According to the results, executives say they need highly skilled employees to keep up with the fast pace of change in business to compete on a global level.

The survey also shows that managers and executives believe that it is easier to develop these skills in students and recent graduates (59.1%) than to develop them in an experienced worker (27.1%), suggesting that students and recent graduates may be more open to new ideas and tools versus experienced workers with established work patterns and habits.

Please rate the following methods for developing employees' four Cs.	**Least Effective**	**Less effective**	**Neutral**	**More effective**	**Most effective**
Prof. development/Training	1.7%	53%	19.6%	553%	18.1%
In-house/Job training	1.4%	7.7%	22.9%	463%	21.6%
Mentoring	0.9%	3.5%	17.6%	46.0%	32.0%
One-on-one coaching	0.1%	2.4%	10.8%	43.5%	43.2%
Job rotation	23%	8.1%	27.9%	43.0%	18.7%

3. Motivation, gender, age, and biases in GBA-recent studies



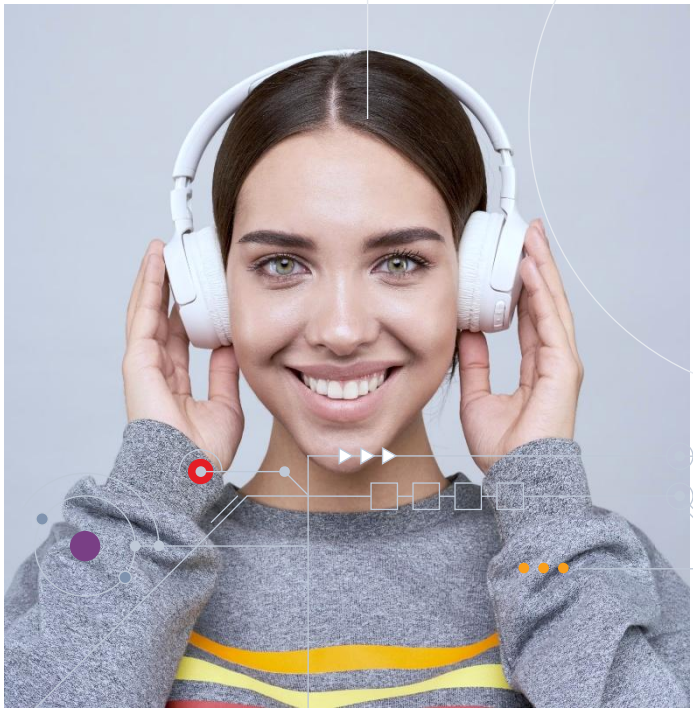
Attitudes and Motivation

Applicants report higher levels of satisfaction and in turn, perceived fairness and organizational attractiveness when the gamified assessment method is used compared to its traditional version.

ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ
ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS

Researchers from the department of management science and technology in Athens University of Economics and Business have conducted a study aimed to **compare the applicants' reactions between a game-based assessment method and a traditional text-based assessment method.** The experimental group has been asked to complete an online game-based assessment, following an online questionnaire measuring their reactions to the assessment method, while the control group has been asked to complete an online text-based assessment, following an online questionnaire, measuring their reactions, as in the experimental group.

Their findings indicated that applicants report higher levels of process satisfaction and in turn, perceived fairness and organizational attractiveness when the gamified assessment method is used compared to its traditional version.



For further reading: *Georgiou, K. and Nikolaou, I., (2020). Are applicants in favor of traditional or gamified assessment methods? Exploring applicant reactions towards a gamified selection method. Computers in Human Behavior. 106356. 10.1016/j.chb.2020.106356.*

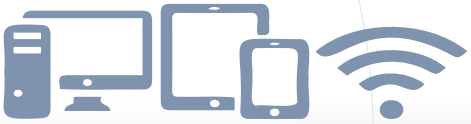
"Our students have changed radically. Today's students are no longer the people our educational system was designed to teach".

This is how Marc Prensky, an American writer and speaker on education recently (2001) stated the problem with education today.

Prensky suggests that the arrival of digital technology in the last decade of the 20th century can be marked as a "singularity" - a dramatic break in the flow of generational change. Prensky therefore holds that "today's students think and process information fundamentally differently from their predecessors". He even suggests that these changes might be found in the very manner in which the new generation's brain functions. As far as thinking patterns are concerned, Prensky is confident that thinks have already drastically changed.

Prensky calls this new generation of high technology usage "Digital Natives", holding that "Our students today are all "native speakers" of the digital language of computers, video games and the Internet". Consequently, all people born before the beginning of the digital era are termed by Prensky as "Digital Immigrants".

"Native Speakers" **Vs.** **"Digital Natives"**



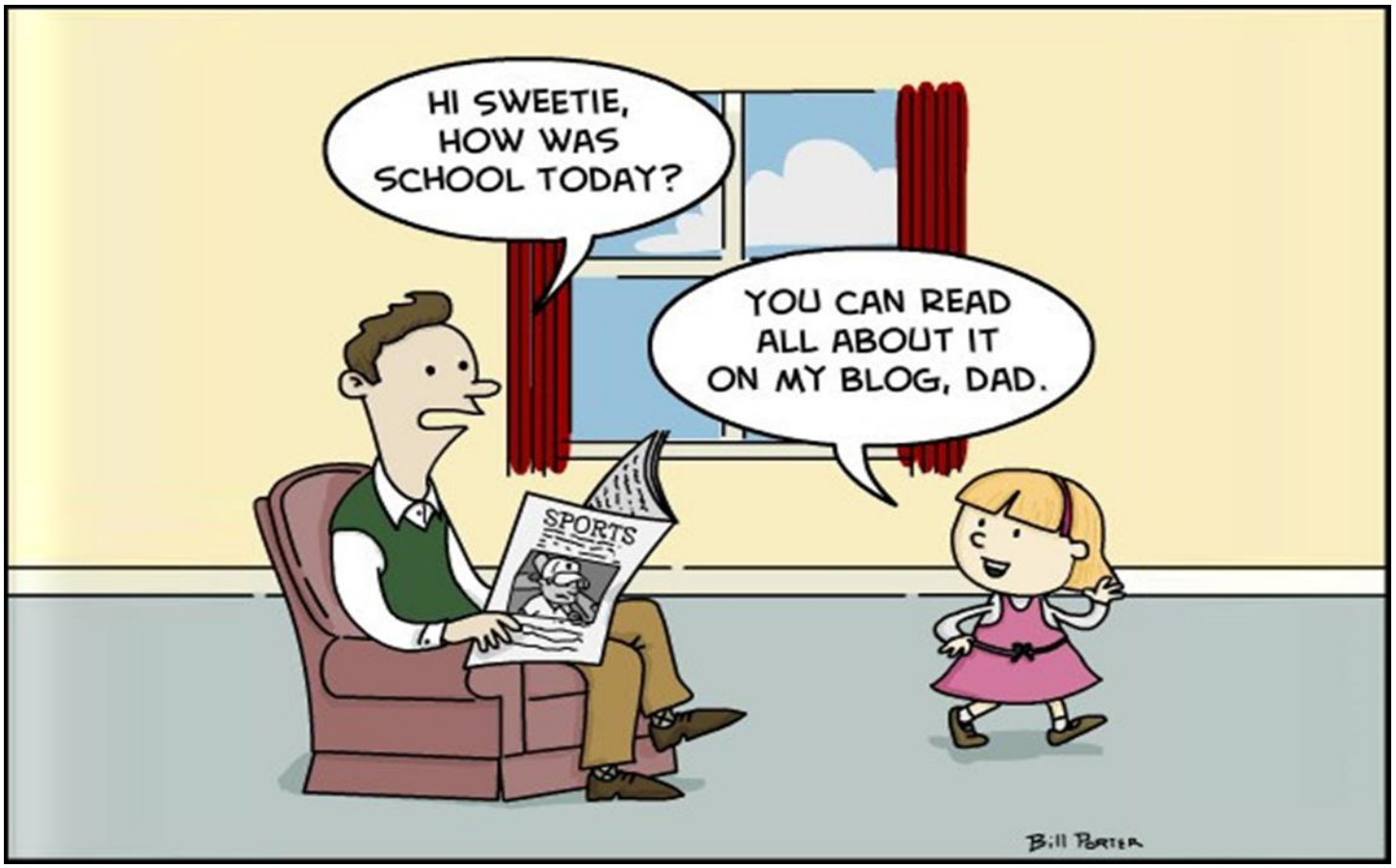
The problem that Prensky identifies regarding education is that "our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language", thus creating a cross-generational dissonance and de motivate the students.

Education today rests on the assumption that learners are the same as they ever were. This is according to Prensky no longer a valid assumption. Traditional education cannot meet the needs and inclinations of the new digital immigrants.

According to Prensky, this gap has to be addressed by the traditional education system that needs to adapt itself to the new Digital Natives in both content and methodology.

Prensky claimed that games should be used for learning as a mean to close the gap. He has coined the term digital game-based learning and listed games' motivating elements: they have goals and rules - which gives us structure and motivation, they are interactive - which gives us an active role, they are adaptive - which allows flow and maximizing motivation , they have outcomes and feedback, they have win states, they have characters and story -which gives us emotion, and more.

Learners in this century have grown up with the Internet as part of their cultural experience. The very fact is that game based learning is now a consistent part of their social experience. It means that the game in the learning and assessment processes contributes to the motivation of the learners and may improve their performance!



For further reading: *Prensky, M., (2001) Computer games and learning: digital game-based. And Prensky, M., (2001). Digital Game-Based Learning. McGraw-Hill Education*

Here is a brief overview of 3 additional studies that examined the relationship between motivation and games as a tool for learning and assessment.

1. A research conducted in the University of Southern California has examined the effect of emotional arousal on human's memory. One of their conclusions was that people pay more attention to

The small details, and better remember information that are highly relevant to them and when they are emotionally involved. These findings indicate that games, which elicit a strong emotional involvement and commitment may yield high recall and long-term retention rates.

For further reading: *Sakaki, M., Fryer, K. and Mather, M. (2014) Emotion strengthens high-priority memory traces but weakens low-priority memory traces. Psychological Science 25(2): 387-395.*

2. The Educational Testing Service (ETS), the world's largest private non-profit educational testing and assessment organization, has published a comprehensive review addresses the impact of motivation on assessment scores.

In that review they pointed out an important concern about the impact of motivation on test performance and validity.

Specifically, they focused on educational measures and the problem of low motivated students and their impact on the test validity.

For further reading: *Finn, B. (2015). Measuring Motivation in Low-Stakes Assessments. Educational Testing Service Research Report ETS RR-15-19.*

3. The use of engaging and exciting games, in which the examinee is emotionally involved and high motivated, may improve assessment validity. In recent years, more researches about the validity of game-based assessment tools which assess examinee's high-levels skills, have been conducted: In one example, researchers from Florida State University and University of Luxembourg used game-based assessment to measure middle-school students' problem-solving skills. To validate their assessment, they compared their results with two external problem-solving measures. Their results indicated that the problem-solving estimates derived from the game significantly correlated with the external measures deals with measuring problem solving skills.

For further reading: *Shute, V., Wang, L., Greiff, S., Zhao, W. and Moore, G. (2016). Measuring Problem Solving Skills via Stealth Assessment in an Engaging Video Game. Computers in Human Behavior, 63, 106--117.*

Summary:

- Technology is already transforming the way we teach, learn and assess.
- The research evidence to date suggests that game-based learning and game-based assessment can appropriately positively impact learning outcomes, improve engagement and motivation, and influence behaviors and attitudes both in adults and young students.

Games for Learning and Assessment: Does Gender and age Make a Difference?

Several studies tested social factors such as gender, age, and cultural identity on the acceptance, usage, and performance of digital games used for assessment. Little is known about how candidates may react to this type of assessment, and what implications this can have for organizations using this method to assess candidates.

In collaboration with Arctic Shores, Athens University of Economics & Business conducted a study with more than 250 participants to check the reaction and effect GBA has on examinees of different ages. Findings from previous research suggest older adults have increased anxiety and lower self-efficacy about using technology. Age has been found to be associated with longer response time, more errors, and lower performance levels. Based on this, It is feared that older individuals may be discriminated against by this assessment method.

There were 2 research questions:

1- Dose age predict performance within game based assessment?

2- Do candidate perceive the game based assessment differently depending on their age?

The initial correlational analysis shows age does not predict performance on a game-based test. No findings were found indicating discrimination based on the examinee's age. It is concluded that GBAs are equal as a suitable assessment method for candidates across a range of age groups and cultures.

For further reading: *Kerr G., Montefiori L., Close L., Nikolaou I., (2019). The Effect of Age and Game Experience on Candidates' Reactions to Gamified Assessments. Arctic Shores website. Downloaded from: https://www.arcticshores.com/wp-content/uploads/2019/09/Research-Poster-Cultural-Differences-and-Faking.pdf*

4. Beyond the Traditional: Artificial Intelligence in Employee Performance Evaluation

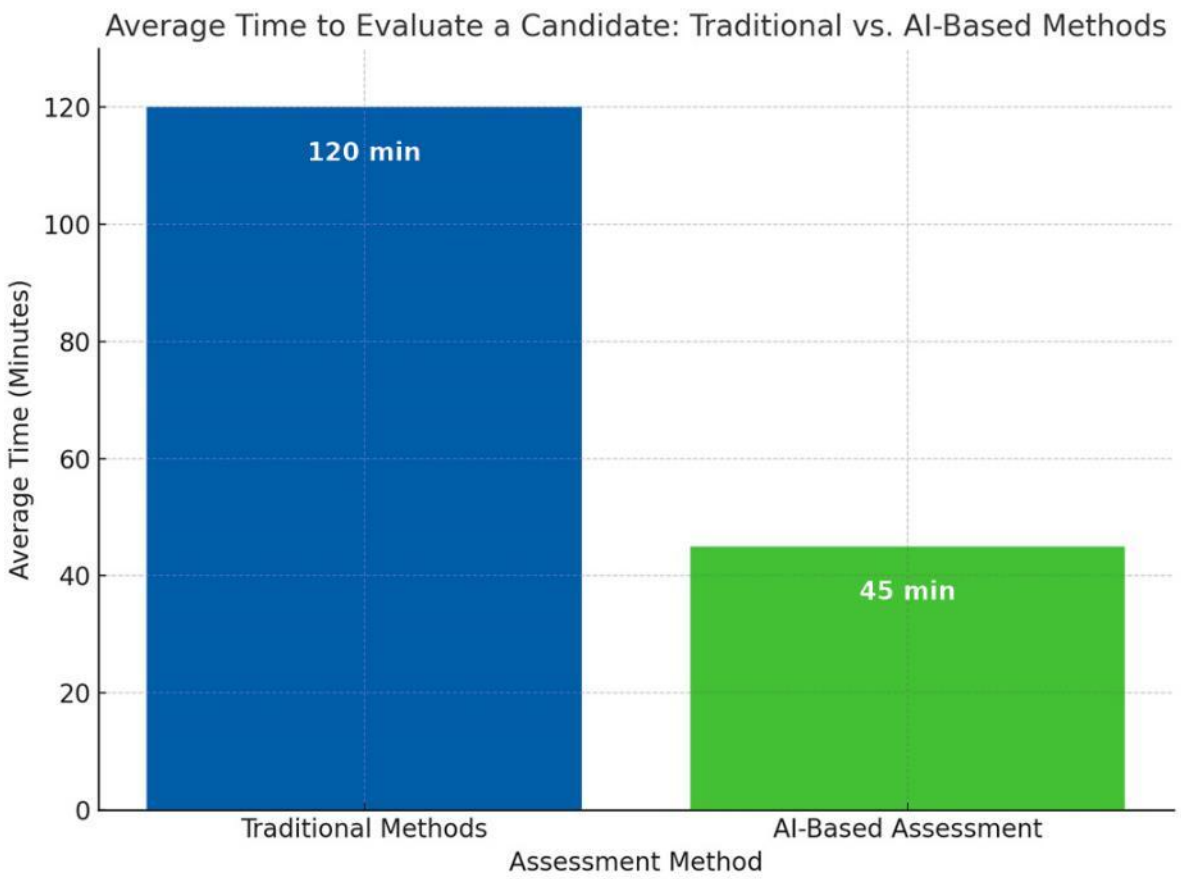
The study investigates whether game-based assessments (GBAs), integrated with artificial intelligence (AI), can:

1. **Accurately evaluate cognitive abilities**, ensuring validity and reliability.
2. **Ensure fairness across diverse candidates**, minimizing biases and promoting equity.
3. **Enhance the overall test-taking experience for candidates**, providing a more engaging, stress-free process.
4. **Satisfy recruiters' needs**, offering transparency, explainability, and trust in AI-driven decisions while addressing challenges such as maintaining system accuracy and mitigating potential biases.

This study introduces an original approach to recruitment by combining **game-based assessments (GBAs)** with **artificial intelligence (AI)** to evaluate cognitive abilities.

The use of AI in this study goes beyond standard analysis by providing actionable tools for recruitment. For instance, the AI-driven game-based assessments allowed researchers to analyze real-time behavioral data from candidates, identifying cognitive abilities like problem-solving, decision-making, and attention to detail. A unique feature of the AI system was its capacity to compare and rank candidates across a large pool efficiently.

By automating the filtering process based on predefined criteria—such as adaptability, critical thinking, or creativity—the AI drastically shortened the time required for candidate evaluation, enabling recruiters to focus only on the top-performing individuals. This not only streamlined the recruitment process but also ensured more objective and equitable decisions, minimizing human biases. Such innovations demonstrate the potential of AI to revolutionize traditional hiring practices, making them faster, fairer, and more accurate.



Ensuring Equity and Addressing Challenges in AI-Driven Recruitment

The research also introduces a new methodology for ensuring **equitable outcomes** by minimizing demographic disparities through AI optimization, something that is often a challenge with traditional assessments. The study also measured recruiters' satisfaction with the unique AI-enhanced game-based assessment process, revealing generally high satisfaction levels. However, several challenges were highlighted that warrant careful consideration. A key concern was the **need for transparency and explainability**, as managers must understand and clearly communicate how AI algorithms make decisions to build trust among employees and stakeholders. Additionally, recruiters emphasized the importance of conducting **periodic audits of AI systems** to ensure accuracy, maintain fairness, and avoid unintended biases. Addressing these challenges is crucial for maximizing the effectiveness and reliability of AI-driven recruitment processes while fostering trust and acceptance among users.

Overall, this research pushes the boundaries of traditional assessment tools by blending AI with game-based assessment, offering a modern, efficient, and fair alternative for talent evaluation.

For further reading: *https://www.wsj.com/tech/ai/ai-jobs-recruiting-apps-considerations-84061b8f?utm*

Authors and Affiliations: *Franziska Leutner, Sonia-Cristina Codreanu, Suzanne Brink, Theodoros Bitsakis.*

Institutions Involved: *University College London (UCL)SHL Global (psychometric tool and talent assessment organization)*

5. Accelium GBA – Adam Milo Validation Research

Any HR leader, hiring manager, or recruiter who is interested in using game-based assessment knows how important is for the tests to be validated. After all, the goal of using game-based assessment is to drive better hiring decisions, which in turn lead to better performance outcomes across the entire organization. The validation process provides the backbone for a test's ability to predict and drive these positive outcomes. The validation process is by no means simple, often requiring a careful study that involves gathering different pieces of evidence to provide a scientific basis for interpreting the test scores in a particular way. There are a variety of different validity measures that can be used to provide this evidence, from criterion validity (how well a test correlates with a certain outcome, such as job performance or turnover) to construct validity (whether a test is measuring what it's supposed to be measuring).

Adam milo research

Adam Milo is the leading and largest company in Israel in the field of human resources. With more than 50 years of experience in recruiting, diagnosing, placing, developing, and advising employees and organizations in Israel and around the world.
Adam Milo has tested some of Accelium's assessment products before integrating them into their solutions. The data they accumulated support its use as a diagnostic support tool.

In one of the validation tests, Adam Milo conducted a large-scale study with about 1000 participants to examine the internal consistency of two central Accelium's evaluation tools': the first tool is based on the game Move It, and the second tool is on the game PingWins.

Internal consistency: assesses the consistency of results across items within the Accelium tests. The most common internal consistency measure is Cronbach's alpha. Most often, the goal is to get an "alpha" of at least 0.7. Assuming the tested items are positively correlated with each other. The results showed that for both tools, Kronbach's alpha was 0.89- 0.90.

It means that in the tests a consistency was found between the different levels of the test.

Further studies have examined Accelium's tool validity. In early 2019, Adam Milo incorporated in their standard recruitment process one of the Accelium assessment tools to test the tool's validity.

The focus was on two main skills: Analytical Ability and Quick thinking. Both skills were defined as significant by the decision-makers in the organization that participated in the study.

It is important to emphasize that the Accelium tool results were not provided to the decisionmakers (i.e., organizations' decisions regarding the candidates relied only on the data obtained from Adam Milo standard assessment tools).

At the end of the recruitment process, a comparison was made between the candidates' results in the Accelium assessment tool who were accepted for the position and the candidates who were not accepted for the position they were examined for.

The chart below shows that significant differences were found in their performances.

In addition to the validation analyses described above, the same group of examinees also participated in a set of tests aimed to examine the correlation between the Accelium Assessment tools to other skill tests Adam Milo is using.

They measured the correlation between Thinking Speed and Analytical Thinking (assessed in the Accelium tests) with understanding instructions, verbal logic, abstract reasoning, and general thinking. For these skills, a high positive correlation was found!

In contrast, a low correlation was found for reading comprehension skills. This finding is not surprising since the Accelium assessments are game-based and do not require examinees to demonstrate this ability.

Figure 2 shows the correlations found between Accelium results and other test results:

	Execution style test	Understanding instructions tests	Reading comprehension test	Verbal logic test	General thinking test	Average
Analytical Ability	0.47	0.42	0.18	0.68	0.67	0.44
Quick Thinking	0.45	0.39	0.28	0.60	0.58	0.41

Table 1: Correlations between one of the Accelium tools, which assesses analytical ability and quick thinking, and other external tests.

The findings indicate convergent validation with applied intelligence tests, systematic thinking, understanding instructions, and abstract reasoning. However, it also shows discriminant validity with tests which their main characteristic is verbal. The correlations are average. Therefore, despite the existing overlap between the skills assessed by the Accelium game-based assessment and the abilities evaluated in traditional assessments, other factors are not measured by the traditional ones. Thus, **the tool contributes to a complete diagnosis of the candidate's skills.**

Another study examined correlations between psychologists' assessments of candidates (based on different tools) and Accelium digital test. Medium and high correlations were found between Accelium tests and assessments related to analytical thinking, learning ability, judgment, and more. In contrast, a low and non-significant correlation was found between our tests and organizational capabilities. This finding is expected since Accelium assessment tools were not designed to test these capabilities.

Summary:

Adam Millo tested the validity and reliability of Accelium's game-based assessment tools. They examined several digital games as alternatives to cognitive diagnosis. They concluded from the accumulated data that the tool supports the diagnosis, and they recommend using it as part of the screening processes they conduct.

Following the data collected from studies presented here, Adam Milo decided to incorporate our game-based assessments into their solutions to recruit and sort candidates for various positions.

6. Accelium Talent Insights- 2024 Study

This section presents the latest findings from our 2024 research, conducted over the past year using data and insights from system users. The analysis highlights key trends in usability, the most popular skills assessed, and the reliability of various tests. By showcasing this diverse and insightful data, we aim to provide a comprehensive understanding of user interaction with the system. These findings are not only a reflection of the system's performance but also serve as a foundation for identifying areas of improvement and enhancing our capabilities to meet user needs more effectively.

Part One: Research Methodology Overview

This section provides an overview of the methodology employed in our study. It describes the approach we took to collect and analyze the data, ensuring a comprehensive and accurate examination of the 23 skills available in the Accelium Plus system.

Over the past year, we conducted a comprehensive and in-depth study to evaluate the skills available for assessment within the Accelium Plus system.

This was involved:

- **9662 examinees** from diverse backgrounds who completed a full test, composed of different skill tests,
- Spanning **10 countries** across **4 continents**,
- A testing period of **1 year**
- Assessment of a total **23 skills**, and
- Representation from a wide variety of population groups.

This study provides valuable insights into the scope and depth of the Accelium Plus system, offering a strong analysis of how these skills manifest across different demographics and contexts.

To conduct this study, we leveraged the extensive database of information and raw data that had accumulated in the Accelium system over the past year. This dataset represented a wealth of real-world performance metrics across the 23 assessable skills. By extracting and analyzing this data, we were able to undertake a series of in-depth statistical and qualitative analyses. These analyses enabled us to identify patterns, trends, and insights.

The methodology was rooted in accuracy and precision, encompassing:

- **Data extraction**: Gathering comprehensive data from diverse user interactions within the Accelium system.

- **Analytical frameworks**: Applying advanced statistical techniques and comparative methods to evaluate performance across different demographics, geographies, and skill sets.

- **Validation processes**: Ensuring the reliability and consistency of the results through cross-validation and error analysis.

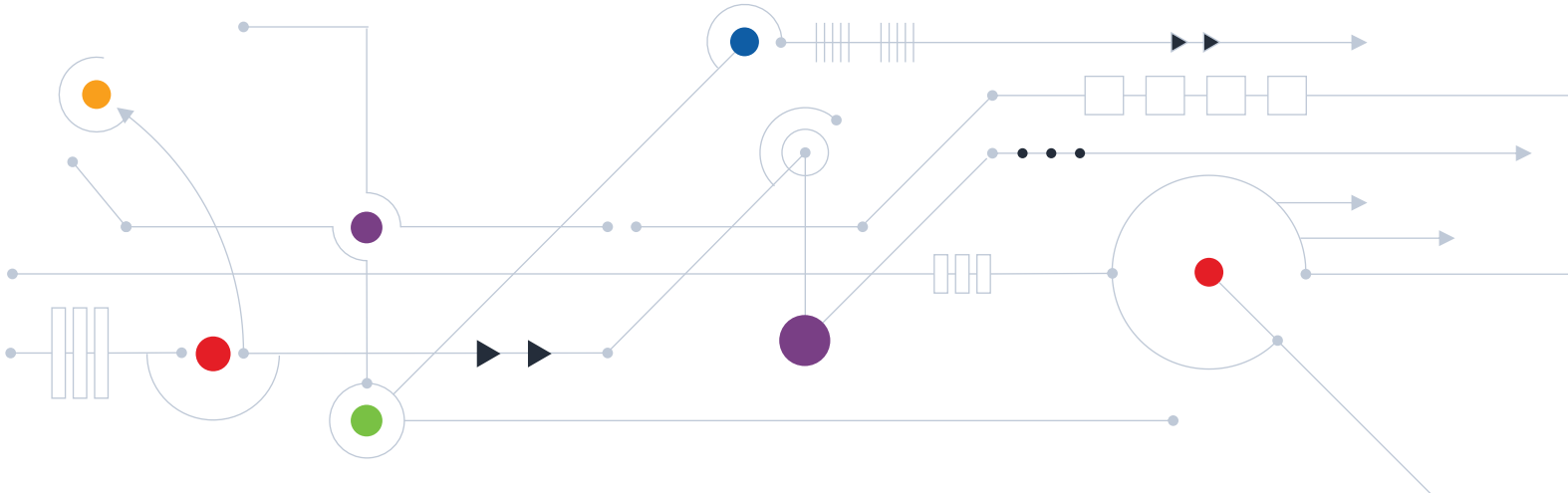
Part Two: Purpose of the Study

In this section, we detail the key objectives and motivations behind conducting the study. It highlights the goals we aimed to achieve, from system validation to the identification of areas for improvement, and provides insight into the broader impact of our findings.

The study was made to achieve several critical objectives:

1. **System Validation**: To assess the reliability and strength of the Accelium assessment system in accurately measuring the 23 skills.
2. **Benchmarking**: To establish performance benchmarks for these skills across different groups and contexts, enabling meaningful comparisons.
3. **Test Improvement:** To evaluate the effectiveness of the current assessment tools and identify opportunities for refinement and enhancement.
4. **Usability Analysis:** To conduct an in-depth study of system usability, ensuring it meets the needs of diverse users and contexts.
5. **Insights Generation**: To uncover deeper insights into how individuals from diverse backgrounds and regions engage with the system and demonstrate their skills.
6. **Continuous Improvement**: To identify areas where the assessment tools and methodologies could be refined to enhance accuracy, fairness, and relevance.
7. **Strategic Development**: To guide future developments in skill-building and assessment by understanding global trends and needs in talent development.

This study is a foundational step in validating the Accelium system's capabilities and shaping its future course, ensuring it remains a leading tool for skill assessment and development.



Part Three: 8 Key Areas of Analysis

This section outlines the eight primary research areas that were the focus of our analysis. It details the specific aspects we examined, including internal validity, usability, and other key metrics, to provide a thorough understanding of the study's scope.

1- Internal Validity: 'Split-Half' Correlation Testing

2- Internal Validity : Compatibility with Other Tests

3. Scores Distribution

4- Examination of Test Times

5- Gender-Based Analysis of Test Performance

6- International Benchmark Update

7- Skills Popularity and Usability

8- Comparative Analysis of Skill Performance Across Different Population Groups

1- Internal Validity: 'Split-Half' Correlation Testing

One of the main research areas was checking the internal validity of the Accelium assessment system using the 'Split-Half' Correlation Testing. This test measures how well different parts of a test work together to assess the same skill.

A split-half test is a method used to measure the reliability of a test, particularly its internal consistency. Reliability factors range from 0 to 1, where higher values indicate better reliability.

In this approach:

- The test is divided into two halves (e.g., odd vs. even questions or first vs. second half).
- The scores from these two halves are then compared to assess how consistent the test items are with each other.

Here's an example: One of the most popular skills in our system is Planning, meaning it is one of the most commonly used skills in assessments.

We wanted to ensure that users consistently achieve similar results when solving different levels of the Planning test over time. **High reliability of 0.73 was observed,** with many users consistently receiving similar scores across various levels of the test

High reliability of 0.73 was observes with a high correlation between the 2 parts of the test.

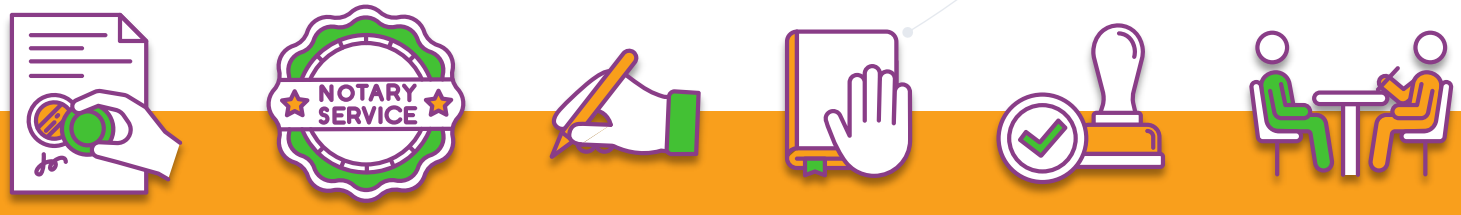
The value **0.73** is a strong indicator that the test is performing well in terms of reliability.

What This Means:

- **Good Consistency**: A reliability score of 0.73 shows that the test is mostly free from random errors and provides dependable results. This means that the majority of the variation in scores reflects actual differences in the planning ability of participants, making the test a solid tool for evaluation.

Why It's Encouraging:

- **Strong Foundation**: A reliability score above 0.7 is commonly accepted as good in the fields of education and psychology. This shows the test is already reliable and can confidently be used for assessments.
- **Room for Optimization**: While the current reliability is already positive, there's still the opportunity to fine-tune and enhance it even further. By improving certain aspects, such as question clarity or test length, this already reliable tool can become even stronger.



2- Internal Validation: Compatibility with Other Tests

In this research area, we examined the correlation between different skills in Accelium plus.

Correlation tests are essential in a system like this because they help us understand how different skills are related to one another. By examining the relationships between skills, we can assess whether they align with our theoretical understanding of how these abilities interact and contribute to overall performance.

What Do We Expect to See in a Correlation Test?

1. **Identifying Overlap**:
    - Some skills may share common underlying traits or competencies. For example, **Planning** and **Time Management** might be strongly correlated because both involve organizational and strategic thinking.
2. **Ensuring Distinction**:
    - At the same time, we expect certain skills to have low or no correlation, confirming that they measure distinct abilities. For example, **Coping with Changes** might strongly correlate with **Flexible Thinking**, indicating that they assess related cognitive or behavioral domains, while showing low correlation with unrelated abilities such as **Task Management** or **Pattern Recognition**, which confirms distinctiveness.
3. **Enhancing Predictive Accuracy**:
    - Understanding correlations between skills can improve the predictive power of the system. For instance, if success in one skill reliably predicts success in another, it might help refine recommendations, benchmarks, or personalized insights for users.
4. **Practical Implications for Users**:
    - These correlations can also guide how we design development plans or assessments. For example, if certain skills are highly correlated, training in one area may also benefit the other, providing a more efficient approach to skill development.

This type of analysis allows us to continually refine and improve the system's design and usability.

Here are some interesting findings and outcomes

We examined the correlation of **planning skills** with the rest 22 skills available in Accelium Plus. We expected to see a mix of correlations:

- **High correlations** between skills that rely on similar cognitive processes or behaviors.
- **Low correlations** for skills that are distinct from one another.

High correlations:

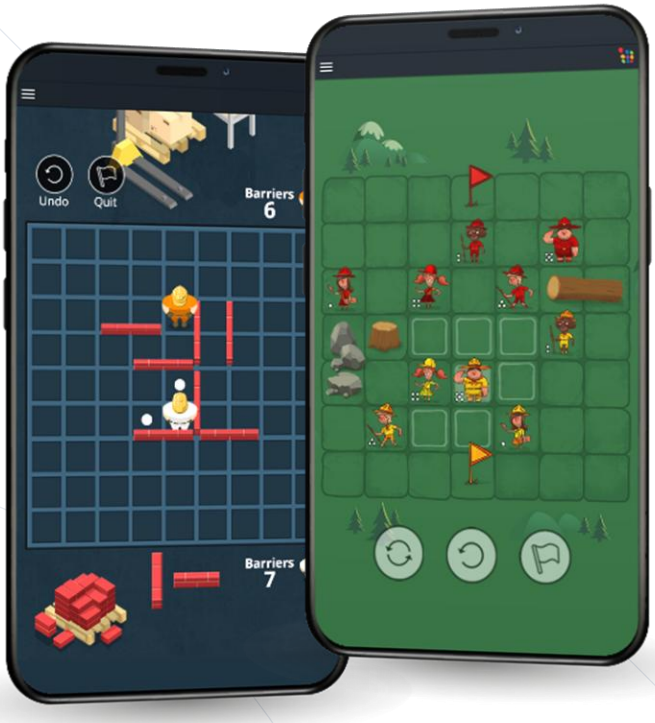
Skill	Corr
Complex Problem Solving	0.52
Developing a Plan	0.51
Learning Aptitude	0.47
Efficiency	0.46
Systematic Thinking	0.43
Analysis and Deduction	0.43
Dealing with Time Pressure	0.39
Logical Thinking	0.38
Flexible Thinking	0.35
Systemic Vision	0.33
Resourcefulness	0.32

A high correlation between **Planning skills** and the listed skills indicates a strong relationship, suggesting that individuals proficient in Planning are also likely to excel in these related areas.

This outcome highlights that these skills share underlying cognitive, behavioral, or personality traits. For instance, both **Complex Problem Solving** and **Planning** involve structuring tasks and adjusting strategies to address challenges, whereas **Systematic Thinking** and **Planning** focus on organization and maintaining logical progression

Low correlations:

Skill	Corr
Accuracy	0.09
Taking Initiative	0.17
Quick Thinking	0.22
Pattern Recognition	0.23
Time Management	0.26
Persistence	0.28
Calculation	0.28
Identify Opportunities	0.29
Resource Management	0.29



A relatively low (non-negative) correlation between the Planning skill and the listed skills suggests that while there is some relationship between them, they are largely distinct abilities.

This means that individuals who are good at **Planning** may not necessarily excel in skills like **Taking Initiative**, **Identify Opportunities**, **Resource Management**, or **Quick Thinking**, as these skills are more about acting in the moment or managing resources rather than organizing and preparing for the future. Similarly, skills like **Persistence**, **Time Management**, **Accuracy**, and **Pattern Recognition** are related to different cognitive or behavioral domains and do not directly depend on one's ability to plan ahead. The non-negative correlation indicates that while these skills may show some positive connection, improving one doesn't necessarily lead to improvement in the other. This suggests that each skill requires specific, targeted development and that training for one does not automatically enhance the others.

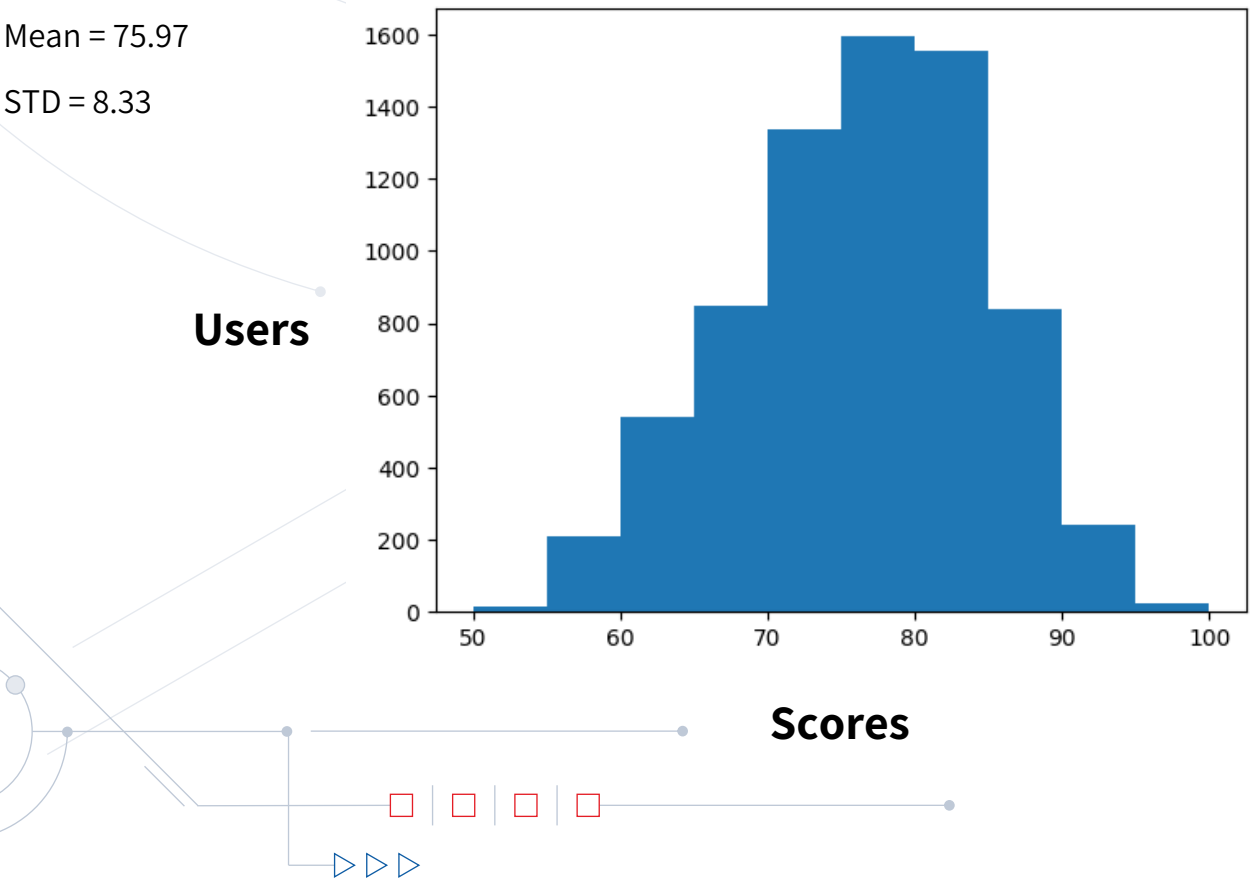
3. Scores Distribution

In the following research area, we analyze the distribution of scores across the tests in the Accelium Plus system, aiming to confirm that the scores exhibit a normal distribution. A normal distribution is characterized by most data points clustering around the mean, with fewer scores as you move away from the center. We also check for the presence of degenerate scores, which are extreme outliers that could skew the results and distort the analysis.

This analysis is important because it helps ensure the reliability and fairness of the test results. By confirming that the data follows a normal distribution, we can be confident that the scores represent the general population accurately, without being influenced by outliers. It also helps us maintain the integrity of the data by identifying any degenerate scores, which could indicate errors or anomalies that might compromise the findings. This allows us to make informed decisions about the effectiveness of the Accelium Plus system in assessing key skills.

The histogram for the Efficiency skill, shown in the below graph, reveals a clear peak at the center, with fewer scores as we move away from the average. This pattern indicates a normal distribution, which aligns with our expectations. The mean score for Efficiency is 76, with a standard deviation of 8.33, reflecting the typical spread of scores.

Similar trends were observed for the Planning and Resourcefulness skills, where the distributions also showed a central concentration of scores, confirming a consistent pattern across the tested areas.



4- Examination of Test Times

Understanding the time it takes users to complete various levels of the assessments is a critical aspect of evaluating the system's usability and effectiveness. Test completion times provide valuable insights into:

1. **Cognitive Demand**: Whether the difficulty and complexity of each level are appropriate for the intended skill measurement.
2. **User Engagement**: Ensuring the test duration is neither too short (lacking depth) nor too long (risking disengagement).
3. **Skill Expression**: Allowing users enough time to demonstrate their abilities without undue pressure.

To illustrate this, let's examine the data collected from another popular test in the system—**Efficiency**. The Efficiency test involves solving 10 "Move-It" game positions, each designed to evaluate the user's problem-solving **speed** and **accuracy**.

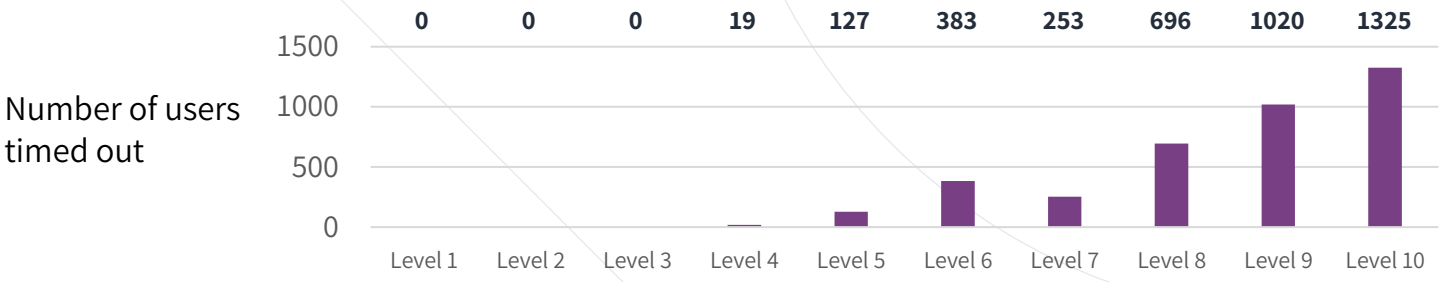
A user's score for each level depends on two factors:

- Their **relative speed** compared to the time limit.
- Their **distance from the optimal solution**.

Skipping a level result in no points awarded.

The final score is calculated based on the total points the user accumulates out of a maximum possible score. The test has a **15-minute time limit**, encouraging both efficiency and precision.

We expected that the efficiency test would challenge users to balance speed and accuracy, leading to varying results across the population.



The test consists of game levels with increasing difficulty, designed to assess the users' ability to complete as many levels as possible. The more levels they complete, the higher their score will be. We expect that not all users will finish all available levels, but there should be noticeable differences in performance. As the difficulty of the levels increases, more users will run out of time and be unable to complete them.
The graph above illustrates this trend, showing that as the challenge level rises, an increasing number of users fail to complete the level within the allotted time.

Another important aspect of the test timing is verifying that our time estimates align with the actual time taken by users. For instance, if we estimated that completing a specific test would take approximately 10 minutes, we wanted to ensure that this closely matched the average time measured during the test.

Why is this test important?
It helps us accurately plan the duration of each test and ensure that candidates are properly informed about the estimated time required to complete the tasks. By validating our time estimates, we can build more balanced tests, manage time expectations, and ensure users can complete the tests within a reasonable timeframe.

Our analysis confirmed that our time estimates are reliable. For example, in the Coping with Changes test, we estimated a duration of 8 minutes to complete the test, and the actual time taken by users was, on average, 6:50 minutes. The median time, which represents the midpoint of the data, was even lower, at just 5 minutes, indicating that the task was completed faster than we had anticipated.

5- Gender-Based Analysis of Test Performance

The importance of this research lies in its demonstration that the Talent Plus assessment evaluates both men and women fairly, ensuring that gender does not influence the outcomes of skill assessments. By comparing the scores of men and women in skills such as Logical Thinking and Accuracy, and Coping with Change, and finding no significant differences in their average scores, we confirm that the system provides an equal platform for all users.

Gender testing is essential in this context because it assures that the system is designed to be impartial, free from biases that could skew results or provide an unfair advantage to one gender over the other. Ensuring that both men and women are equally evaluated not only supports the scientific integrity of the Accelium system but also reinforces its reliability and validity. This type of testing guarantees that the Accelium system accurately reflects the abilities of each individual, based solely on their skills and not influenced by gender stereotypes.

In a broader context, this analysis underscores the commitment to equality and fairness, providing confidence to all users, stakeholders, and institutions that the system can be trusted as an unbiased and effective tool for skill development.

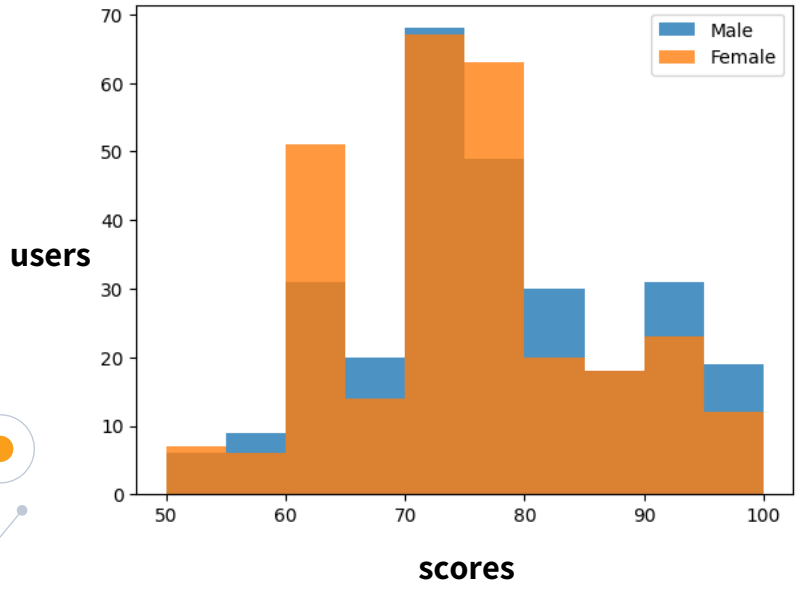
We specifically compared the scores of men and women in the skill of Coping with Change and found no significant difference in their average scores. This indicates that the test assesses this skill equally for both genders, with neither men nor women showing a systematic advantage. The results suggest that the system is gender-neutral in evaluating the ability to adapt to change, demonstrating its fairness, consistency, and reliability in measuring this particular skill for all users.

The graph below illustrates the near-complete overlap between the scores of men (in blue) and women (in orange).

The average score for men in this test, dealing with change, is 76.7, while the average score for women is 75.95.

The significant overlap in the scores indicates that there were no notable differences in performance between the two groups.

The graph displays the distribution of scores for the skill of coping with change, comparing two equally sized groups of women and men.



6- International Benchmark Update

This research focused on analyzing data across various cross-sections of countries and continents. By examining performance metrics from diverse populations, we were able to update the system's comparison groups, ensuring they reflect the latest global trends and regional nuances.

These updates allow us to offer more accurate and relevant benchmarks, providing users with a clearer understanding of their performance relative to others in their country, continent, or globally. This ensures that our assessment system remains a reliable tool for meaningful skill evaluation across different cultural and geographic contexts.

7- Skills Popularity and Usability

We analyzed the usage patterns of the 23 skills currently available in the system to identify which are most commonly selected for assessment tests. By examining how frequently each skill is utilized, we gained valuable insights into their popularity and relevance across different user groups. This breakdown highlights the skills that are most in demand, helping us better understand user preferences and ensuring that the system remains aligned with the needs of diverse populations.

List of skills based on their popularity

1	Flexible Thinking	13	Systemic Vision
2	Coping with Changes	14	Taking Initiative
3	Efficiency	15	Complex Problem Solving
4	Time Management	16	Persistence
5	Planning	17	Resourcefulness
6	Systematic Thinking	18	Quick Thinking
7	Analysis and Deduction	19	Identify Opportunities
8	Learning Aptitude	20	Accuracy
9	Logical Thinking	21	Calculation
10	Resource Management	22	Pattern Recognition
11	Developing a Plan	23	Task Management
12	Dealing with Time Pressure		

The popularity of the top five skills—**Flexible Thinking**, **Coping with Changes**, **Efficiency**, **Time Management**, and **Planning**—provides valuable insights into current market demands and workforce priorities. Here's what these preferences reveal:

1. **Adaptability as a Core Competency**:
    - The high demand for **Flexible Thinking** and **Coping with Changes** reflects the growing need for individuals who can adjust their strategies and approaches when faced with new challenges or shifting circumstances. These skills are particularly valuable in industries experiencing rapid technological advancements or frequent market disruptions.

2. **Focus on Productivity**:
    - The popularity of **Efficiency** highlights the importance of achieving optimal results with minimal waste of time or resources. Similarly, **Time Management** is critical for ensuring that tasks and projects are completed on schedule, which is essential in fast-paced and competitive work environments.
3. **Strategic and Organizational Abilities**:
    - The inclusion of **Planning** among the top skills underscores the value of being able to set priorities, anticipate potential obstacles, and design effective action plans. This skill is vital for both short-term task management and long-term goal achievement.
4. **Alignment with Modern Work Trends**:
    - In remote and hybrid work settings, **Time Management** and **Planning** are particularly crucial for maintaining structure and productivity. Similarly, **Coping with Changes** is essential for navigating the uncertainties and adjustments inherent in these flexible work environments.
5. **Implications for Learning and Development**:
    - The emphasis on **Flexible Thinking**, **Coping with Changes**, and **Efficiency** suggests that organizations should focus on training programs that enhance adaptability and productivity. This ensures that their workforce is well-equipped to thrive in dynamic, fast-evolving industries.

8- Comparative Analysis of Skill Performance Across Different Population Groups

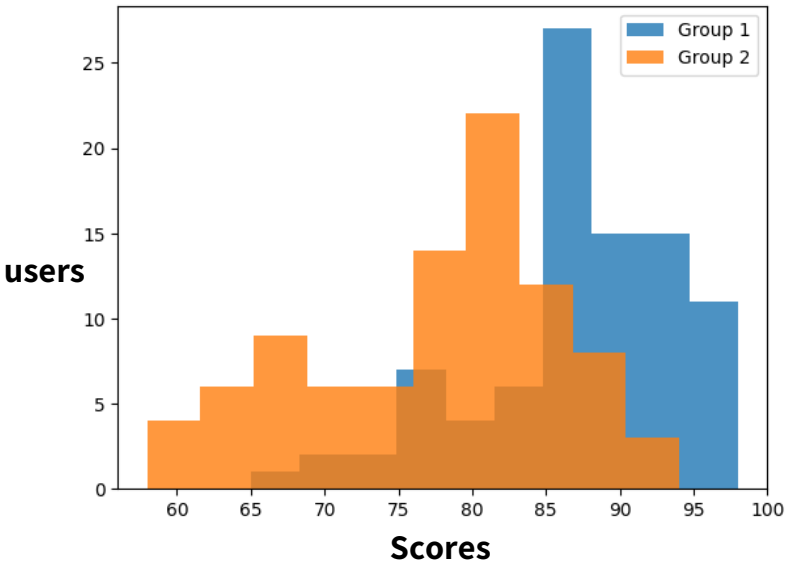
Comparing data between different groups in the population involves analyzing how different subsets of people (e.g., age groups, job roles, educational backgrounds, or other demographic factors) perform on various skills.

This type of analysis helps us to **validate or refine our hypotheses**, ensuring that our predictions about success and skill performance are accurate. It can reveal whether the skills we are assessing are universally important or whether their significance varies depending on group characteristics.

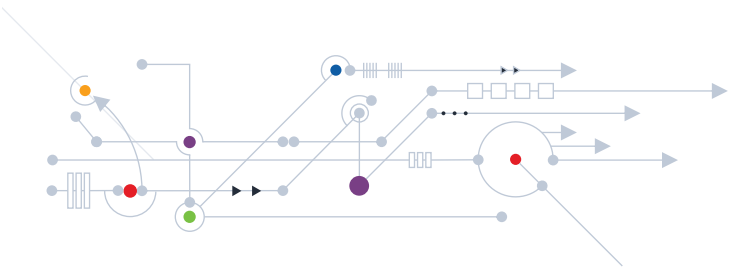
For this study, we compared the performance of two distinct groups: senior managers and high school students. The focus was on assessing their abilities in critical cognitive skills such as logical thinking, pattern recognition, and mental flexibility. These skills were chosen for their universal relevance across various professional and academic settings, as well as their importance in problem-solving and decision-making.

The findings of the study confirm our initial hypothesis. For instance, in the Logical Thinking test, senior managers (Group 1) achieved an average score of 87.4, significantly higher than the average score of 77.2 achieved by high school students (Group 2). These results demonstrate the impact of experience, professional development, and advanced cognitive training on performance.

Senior managers exhibit a more refined ability to analyze, interpret, and solve complex problems compared to high school students, who are still in the early stages of their cognitive development.



A visualization of the data clearly shows that the scores of senior managers (Group 1) are predominantly positioned to the right of the scores of high school students (Group 2) on the performance scale, indicating higher overall achievement.



Similarly, significant differences were found between the groups in Flexible Thinking and Pattern Recognition skills, where senior managers consistently scored higher than high school students. This suggests that professional experience and advanced cognitive development contribute to enhanced performance in these areas.

Future Directions in our Research

While the data collected over the past year provides valuable insights and reinforces the reliability of the system and the tests, the field of research remains vast and full of opportunities for exploration. To ensure continuous improvement and adaptability, it is essential to expand our research efforts and further enrich our understanding of the system’s impact.
Moving forward, our research will focus on several key areas.
First, we will undertake numerical expansion by increasing the volume of measured data, allowing for more robust statistical analysis.

Second, we will test existing hypotheses on larger and more diverse populations to enhance the generalizability of our findings.

Third, we aim to conduct a deeper analysis of skill coverage, providing a more nuanced understanding of the factors influencing performance and skill development.

Additionally, we will explore new research segments, such as analyzing the influence of test takers' age, which may reveal important demographic trends.
Another critical direction will involve learning from customers and their unique use-case scenarios to ensure the system remains aligned with real-world needs. These efforts, combined with ongoing data collection and analysis, will help identify emerging trends, refine our methodologies, and uncover new opportunities for system enhancement.

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Chapter C: Application

Game-Based Assessment is becoming very popular!

In this chapter, you will get a glimpse of the extensive activities that have taken place in recent years in the context of assessment and game-based learning using Accelium tools and learn about the perspective of consultants who work with the tools for various purposes.

1. Accelium's Vision in Artificial Intelligence

The integration of artificial intelligence into Accelium's educational and assessment tools addresses the growing need for innovative and adaptive solutions. As the demand for personalized and efficient methods of teaching, learning, and evaluation rises, AI plays a crucial role in enhancing these experiences.

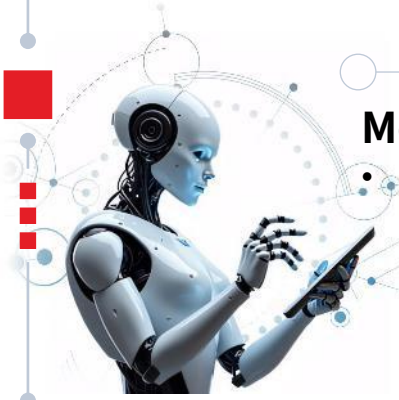
Accelium has also developed a strategic roadmap for future development, encompassing existing innovations, short-term advancements, and medium-term projects to ensure continuous improvement and relevance in the educational landscape.

Current Applications:

- **Personalized Gamified Platform**: AI adjusts game difficulty to match learners' abilities, enhancing engagement and achievements.
- **Plus Chat for Learning and Assessment**: An AI chatbot helps educators create customized courses and assessments, providing tailored recommendations for skills evaluation and learning solutions.

Short-Term Developments:

- A new AI-powered chatbot will analyze assessment reports, reorganize data, and generate custom insights for decision-makers. This tool will support identifying gaps in classrooms, teams, or organizations and enhance data-driven decisions.



Medium-Term Developments:

- AI chatbots will guide learners during gameplay, offering strategy tips, explaining moves, and connecting game concepts to real-life applications, deepening the learning impact.

Current Applications:

Accelium leads in AI-powered education by integrating artificial intelligence into its products in various ways:

1. **Personalized Gamified Platform**: AI adjusts the difficulty levels in games to match each learner's ability, offering a tailored and interactive learning experience that enhances engagement and improves outcomes.

2. **Plus Chat for Learning and Assessment**: Accelium has developed an AI-driven chatbot to assist educators and advisors in creating personalized courses and customized assessments. The chatbot provides tailored recommendations, structures, and content for each group or student, ensuring more precise evaluations of skills and competencies.

Short-Term Developments:

Accelium is developing an advanced chatbot that will explain assessment reports within the system. This tool will analyze and reorganize data based on educators' or advisors' requests, providing customized reports tailored to specific needs. It will allow professionals to perform data analyses, identify gaps within teams or classrooms, and compare results to benchmarks. The chatbot will help decision-makers make data-driven choices and address areas for improvement more effectively.

Medium-Term Developments:
Accelium is planning to integrate a chatbot into the game interface, guiding learners through gameplay by providing advice on moves and explaining their rationale.

The chatbot will also engage learners in discussions about applying game concepts to real-life situations and offer additional examples for better understanding. This will deepen the educational impact and practical application of learned skills.

Summary :
This integration of AI technologies highlights Accelium's commitment to advancing education and adapting its solutions to the digital age. The advancements in artificial intelligence will enable Accelium's products to become more personalized, provide users of the Plus system with new tools for designing thought pathways and assessments, and interpreting results and reports.

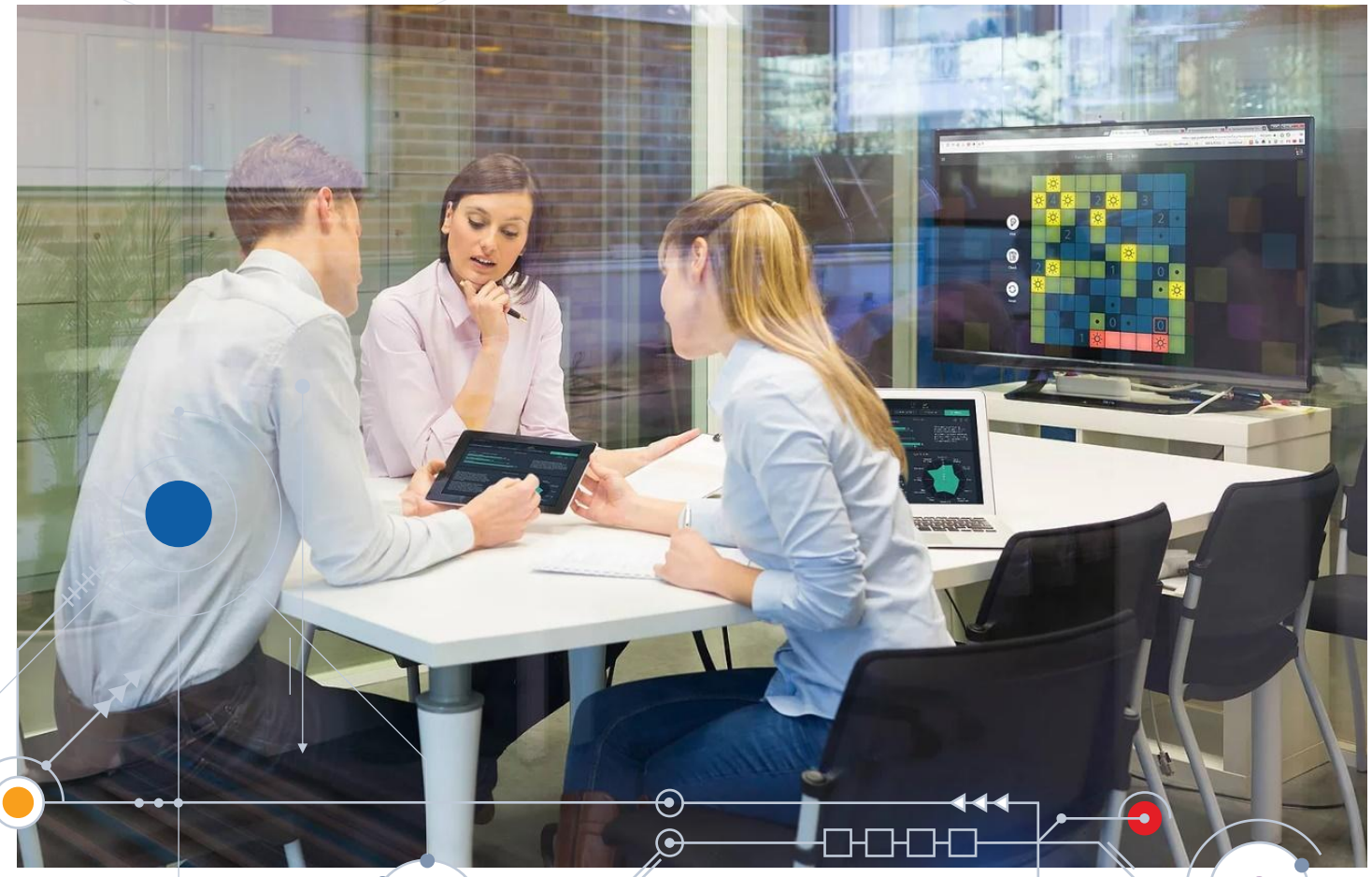
Furthermore, these innovations will support personalized mediation processes, enhancing the overall user experience and impact of Accelium's educational solutions. The advancements in artificial intelligence will enable Accelium's products to become more personalized, provide users of the Plus system with new tools for designing thought pathways and assessments, and interpreting results and reports. Furthermore, these innovations will support personalized mediation processes, enhancing the overall user experience and impact of Accelium's educational solutions.

2. New Consultants Survey Reveals- Accelium's Game-Based Assessment is an Effective Tool!

"My experience has been eye opening as the report oftentimes speaks to the individual's skill set and helps make the recruitment process easier and less stressful. It has also reduced shortlisting time by over 50%A consultant working with Accelium tools."

A consultant working with Accelium tools.

Organizational consultants use Accelium tools in different organizational processes: employees' evaluations, self-development processes, talent and management development processes, learning processes, and recruitment processes. They undergo appropriate training to work with various Accelium tools: the application, the assessment tests, the reports, the workshops, etc.



We surveyed worldwide consultants who work with Accelium tools to evaluate their satisfaction with our tools. The following are the results.

A few dozen of our consultants reported positive feedbacks from their clients regarding the Accelium products. Specifically, **89%** of our consultants reported positive feedback regarding the examinees' test experience and the test results and **94%** reported positive feedbacks regarding the whole process.

The Accelium assessment tools are a unique and innovative ways of evaluating critical thinking skills. It is unique such that employees can be objectively evaluated on skills that determines success on the job. The reports are robust and provides practical ways the examinee's strengths can be leveraged and weaknesses can be improved.

I have conducted a few feedback processes based on the Accelium tools. In general, my clients' experience and mine was very good. The Accelium assessment correlates with their self-assessment and provides them with more accurate insights.

The Consultants' satisfaction

94% of the surveyed consultants reported they find the Accelium system useful, comfortable, and user-friendly.

For some of my clients, the world of technology is less relevant and not in everyday use. The Accelium system was simple to use, intuitive, and guided them through all assessment stages.

All of the consultants confirmed that the Accelium reports provide their clients with useful, meaningful information about their users. **94%** reported that Accelium testing is accurate, which means they fit the examinees' skills ability.

I have run hundreds of 1 on 1 feedback sessions with managers who took Accelium 360formative assessment test. Almost all those sessions were meaningful, promoting and authentic.

People find Accelium game- based assessment accurate, insightful and extremely relevant to their professional and personal challenges.

The same percentage - **94%** reported that Accelium provides them with a useful evaluation tool that meets their needs and clients'.

Over the last 4 years I have used Accelium assessment tools with clients from different industries such as banks, high-tech companies, government offices, security organizations, universities and more.

All our clients saw great value implementing an innovative, out of the box, deeply thought and effective solution such as Accelium 360 and Accelium Talent.

3. Learn from the experience of an organizational consultant

We interviewed Nadav Agozi. Nadav is leading the Growth Center in Israel. Nadav has many years of experience working with thinking games- first-hand experience as a chess player, facilitator of executive development programs, and guide senior executives in personal and professional growth processes.

What is the importance of integrating games into learning processes and skill assessment?

Nadav: Games have a dual contribution to our executive development programs we deploy in organizations. The first is related to the creation of learners' high engagement and involvement. People love to play, especially if it's instead of working or instead of putting an effort to listen to a lecturer. Therefore, a game always stands in contrast to attending a lesson and is always surprises the participants who jump at the opportunity to do something different. In Accelium's learning processes, people are alert; they laugh, talk, and emotionally involved. When people play, they open up. Open to their learning colleagues, open to the facilitator, and open up to themselves. By the way, this is a contribution that training managers are well aware of and rightly seek.

But there is a less trivial and no less important contribution. The game is a great simulation tool.

It allows us to demonstrate and reflect on thought processes without talking about professional issues. When a person plays, we can recognize his thinking style and how he copes with challenges. The thinking processes are reflected not only by the Accelium system and the workshop facilitator. They are reflected by the participants themselves, who recognize their strengths and weaknesses and instantly recognize the importance of developing these abilities.

In what kind of processes and with which groups do you recommend combining game-based assessment and learning?

Nadav: Game-based assessment and learning are relevant for almost any learning process and any group because of what we mentioned earlier. It can be a one-time meeting, multiple meetings, professional staff groups, executive groups, small groups, and large groups. The contribution of the game will be welcomed by all of them.

I find that the significant contribution of these tools is in executive development and growth programs. In these programs, the participants come with the goal of learning and developing. The context makes it possible to deepen the learning with each and every one of them, create a diagnosis of their thinking profile and connect the learning significantly to their professional challenges.

Can you expand on a number of organizations you have worked with?

Nadav: The projects we have carried out in Israel with Accelium are varied and interesting. I will mention three that I think give an understanding of the range of possibilities.

A. Protalix Biotherapeutics

One of the first projects we carried out using Accelium's game-based tools was at a biotech company by the name Protalix.

The client:

Protalix is a biopharmaceutical company focused on the development, production and commercialization of recombinant therapeutic proteins. The company was founded as a greenhouse company in northern Israel in 1993. Protalix is proud to be the first company to gain FDA approval for a plant cell culture expressed protein. Protalix operates in competitive, knowledge-intensive markets, requiring employees and managers to handle dynamic and highly complex challenges in a sales cycle that demands both a well-formed strategy and high tenacity.

Participants Profile

The program was attended by 20 leading employees from the organization, those defined by managers in the company as employees that the organization wants to nurture.

	20 Participants	9 Managers 4 Engineers 5 Lab specialists and researchers 2 Finance and operations
	40 Y/0	The average age of participants
	6 Years	Average time at Protalix

Program Objectives

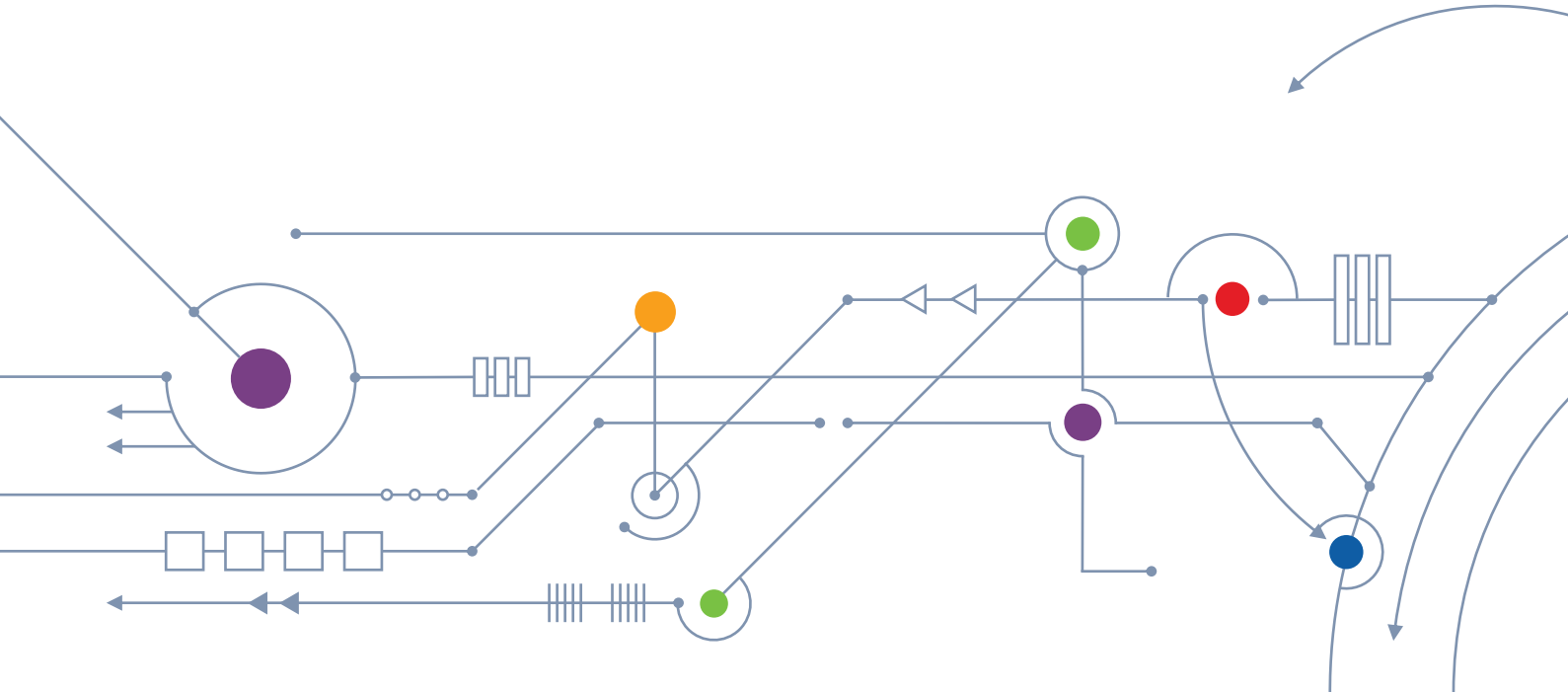
1. Expose participants to innovative strategic tools for management, problem solving and decision making.

2. Boost motivation in a fun, unorthodox and thought-provoking atmosphere.

3. Inspire participants to reflect about their roles: explore potential growth opportunities and identify inhibitive factors.

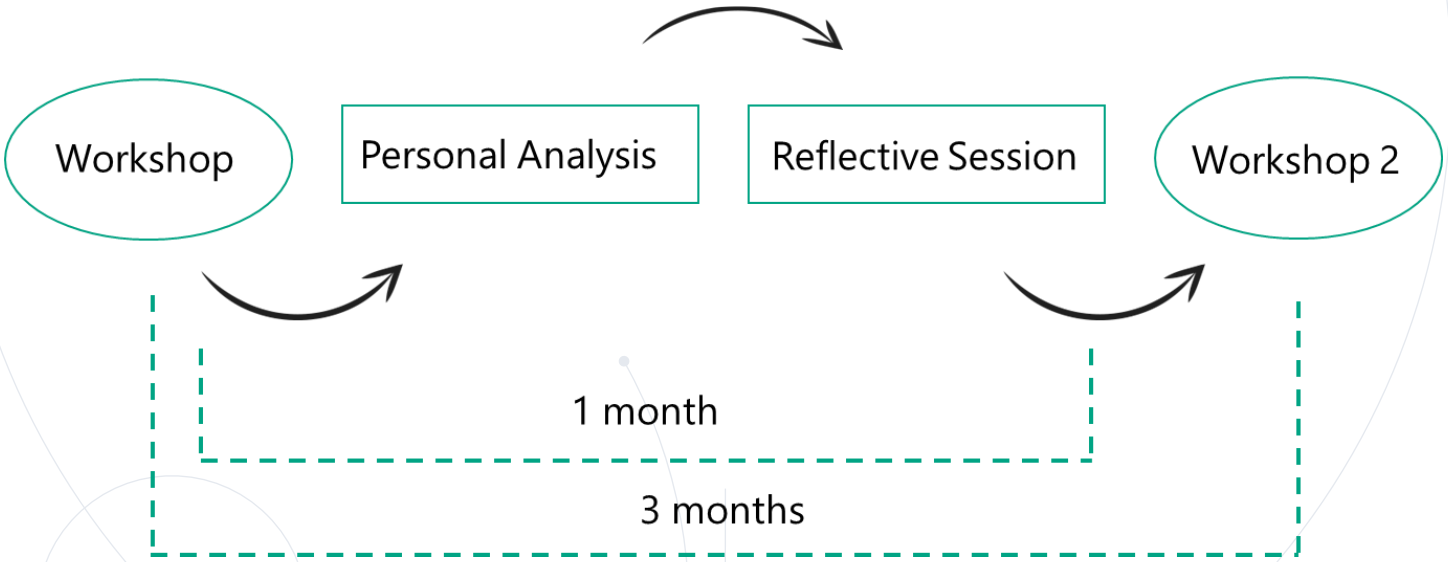
4. Create an opportunity to break from the restless routine and gain new perspectives on organizational and personal challenges.

5. Stimulate a free, profound, cross-organizational discussion about work processes.



The Process

We planned a blended program with four quarterly workshops, followed by internal meetings in between the workshops in which participants discussed ways to apply the tools they acquired in the workshops to solve professional challenges and streamline them to their work processes.



Applying the thinking tools participants acquired during the program's implementation led to real and significant breakthroughs in the teams' everyday work, opened new ways of thinking, and received praise.

Engagement

90% Completion rate
Accelium Pro exercises following the workshop.

100% teams presented a detailed analysis of insights gained about their work processes.

"A fresh wind just swept through the Protalix hallways. I'd gladly recommend Accelium to any knowledge-based organization. I think the program is great for several audiences: new workers being groomed for management positions, hi-potential managers climbing up the ladder, and leading, committed employees who are invaluable for the company's growth. The essence and mindset of Accelium is perfect for thinking organizations like ours, where employees are constantly facing intellectual challenges and need to reflect and keep sharp on the long run, through extensive, complex projects".

Daphna Shelly, VP Human Resources

Nadav: Another project, which is interesting to review in these contexts, included a series of workshops for service centers in the Tel Aviv Municipality. The service department director wanted to improve the call centers' ability to understand the city residents' problems and provide an appropriate solution. Due to the routine nature of focus work and burnout in this type of position, the emphasis was on breaking fixations, "shaking up" thinking patterns, and developing flexible thinking. The workshops we conducted had a powerful impact on the participants and enlightened their eyes. For the first time, they understood the mental challenge they were facing every day and learned and practiced tools to provide a more satisfying answer.

B. Tel Aviv Municipality

The Tel-Aviv Yafo Municipality provides municipal services to the city's 418,600 residents, 50,000 businesses and millions of yearly visitors. The Municipal Service and Public Inquiries Office, an independent unit under the Mayor's Office, is responsible for improving the quality of service across all of the municipality's branches and units.
This includes Property tax service, Parking services, The city's Call Center, Transport, Education, Water services and more.The client wanted municipal service centers to adopt a customer-centric approach. They wanted service representatives to listen intently and empathize with service recipients, avoid prejudice and bias, be flexible and creative, and look for solutions that satisfy the customer rather than focusing on the procedure. The main challenge was overcoming the demanding conditions of the call-center environment: overworked staff and high-stress levels. A high personnel turnover makes knowledge retention difficult, and Service Representatives tend to "put out fires".

Participants Profile

	52 Participants	2 Groups – 15 Service Representative 2 Groups – 11 Shift Supervisors each
	Late **20s** – Early **30s**	The average age of participants
	1 Venue	Average time at Protalix

Program objectives

1. Build a deep awareness of problem-solving processes

2. Develop individual Problem-Solving skills:
- Encourage methodical fact-gathering and analysis
- Avoid unfounded assumptions and decision bias
- Distinguish between core problems and symptoms
- Break complex problems into simpler sub-problems

3. Discover effective strategies for creative problem-solving:
- Methodically gather and analyze information
- Evaluate multiple solutions before acting
- Recognize and effectively adapt to change
- Shift perspectives and generate new solutions

The Process

To ensure the workshops correspond with the client's needs and "speak their language", we researched the municipality's challenges and organizational culture:

- We held a preliminary meeting with the head of the Municipal Service Office and the unit's project managers, which was used to define the unit's needs and understand the problems faced by different stakeholders at the office. The attendees expressed their expectations from the skill development process, which included both professional skill development and personal development in various domains.
- Spent a day observing call-center representatives at work, listening in on service calls, studying the unit's unique terminology and interviewing employees and managers.
- Conducted a focus group with Shift Supervisors to map out their needs and identify skill gaps.
- Met with client's Customer Service Consultant to coordinate Supervisors' workshop.

A series of game-based skill development workshops aimed at 2 target groups in the Municipal call centers' staff: Service Representatives and Shift Supervisors.

	Workshop Duration	Focus	Registration
Service Representatives	Full day	Proactivity, Problem Analysis	Voluntary
Shift Supervisors	2x Half day	Flexible Thinking, Creativity	Mandatory

Engagement

80% Completion rate
Accelium Pro exercises following the workshop
100% of participants rated the workshops as practical and applicable to their position.

"The atmosphere in the workshops was fantastic: positive and fun. The Method's combination of game-playing and discourse creates a very high level of involvement. The vast majority of participants take a genuine interest in the workshops and actively participate in the games, discussions and exercises"

"...several new insights and perspectives emerged immediately when the supervisors wrote down their post-game analysis. It was an excellent expression of the quick transfer and translation of game concepts to new attitudes and active behaviors."

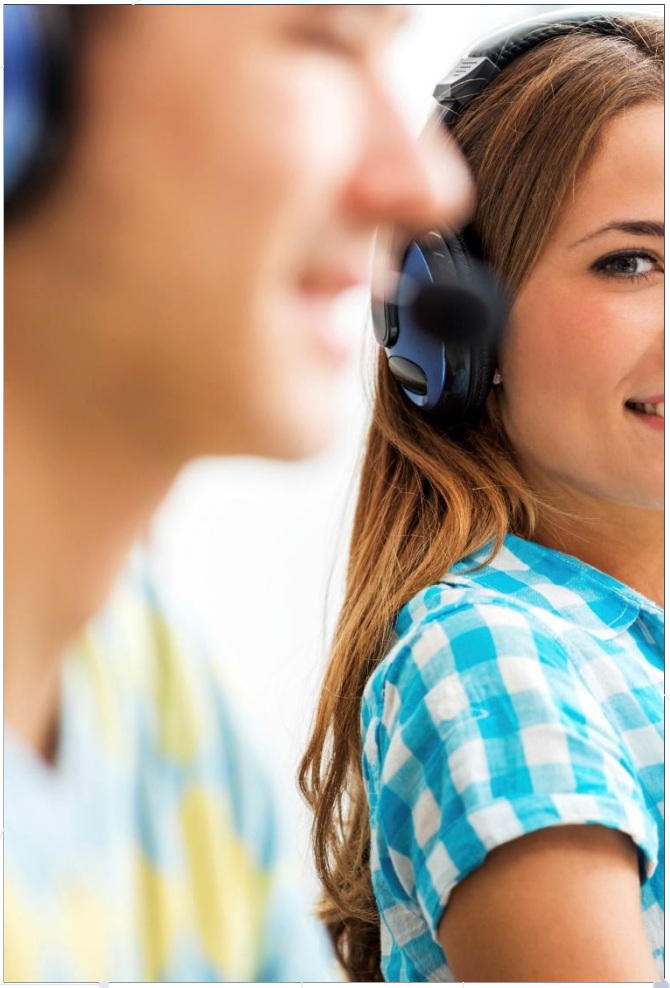
Avital Braiman Ezra, Facilitator

"I learned to listen more carefully. I'm used to working automatically, thinking I can predict everything the customer will say and 'shoot' all the answers at them. But the solution comes from truly listening, there might be something I'm missing, I don't have to know it all."

Service Representative.

"It was fascinating, I'm leaving with a different mindset than the one I came with. I want to bring more of myself to the job."

Service Representative.



Nadav: The third project I will describe was carried out at Discount Bank and was perhaps the most significant. As part of the project, we built an executive development program that included group workshops, evaluation tests and personal training. Over two hundred executives from all divisions of the Bank participated in the programs.

C. Discount Bank, Ltd.

Discount Bank, Ltd. is retail bank, commercial bank, private bank and financial services company headquartered in Tel Aviv with 112 branches throughout Israel. Discount Bank is a public company traded on the Tel Aviv Stock Exchange under the symbol DSCT. It provides personal banking, business banking and private banking products and services through physical branches, online banking and mobile banking.

Participants Profile

A diverse group of leading employees and mid-level managers representing a cross-section of the organization

	200 Participants	10 Groups
	2 Accelium Facilitators	The average age of participants
	2 Years	Average time at Discount Bank

Program objectives

- Expose participants to innovative strategic tools for management, problem solving and decision making.
- Boost motivation in a fun, unorthodox and thought-provoking atmosphere.
- Inspire participants to reflect about their roles: explore potential growth opportunities and identify inhibitive factors.
- Create an opportunity to break from the restless routine and gain new perspectives on organizational and personal challenges.
- Stimulate a free, profound, cross-organizational discussion about work processes.

Users' reviews

At the end of their training, one group of the Discount Bank talent development program were asked to answer a questionnaire about the training. As seen in Error! Reference source not found., the results show high satisfaction from the training in general, and specifically from the individual assessment and the use of the Accelium application during the training. The respondents (n=17) were asked to evaluate (and rank from 1 to 6) different elements in the training:

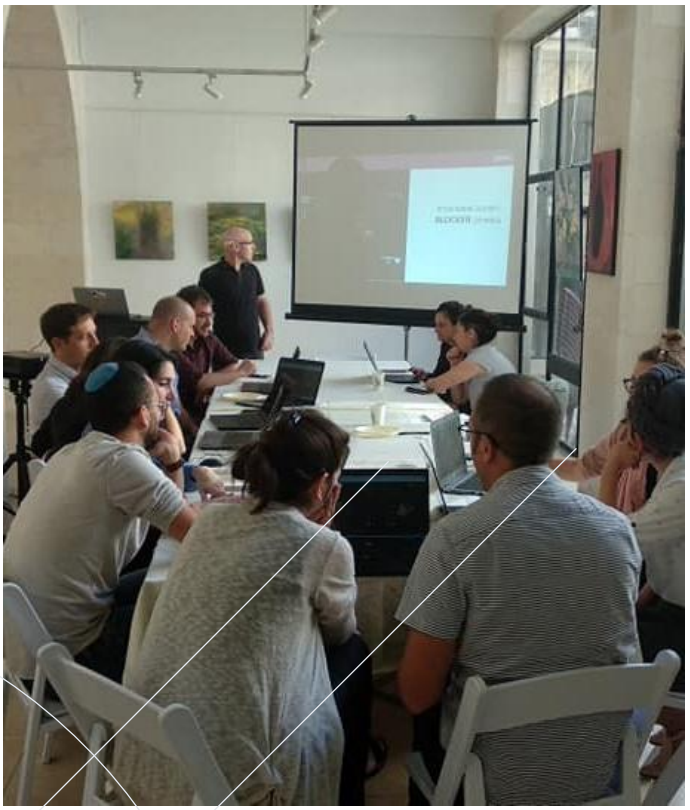
The element	Average score
The contribution of the training	5.6
The contribution of the application	5.8
The contribution of the application	5.6
Will you recommend this training to other employees	5.8

Table 1: The Discount survey's results.

What is the difference between applying game-based programs to senior executives and other employees in organizations? What is your take regarding people who have not yet entered the job market?

Nadav: One of Accelium's programs for developing thinking skills is designed to work in the academy.

We work with students from different faculties (computer science, engineering, business administration), and their lack of business acumen is noticeable. The connection of the thinking tools acquired during the workshops is often used to deal with personal challenges. One of the interesting aspects of this context is the program's contribution to young people's coping with making decisions about their future in general and employment in particular.



Ruppin Academic Center

In the past year, we have been carrying skills development programs for B.A managers at Ruppin Academic Center.

Two groups of students participated in a series of online game-based sessions in which we practiced and learned thinking tools for decision making, problem analysis, and problem-solving. The students even performed the Accelium 360 Assessment to map their thinking style. Ruppin Academic Center, like many academic bodies, has been trying in recent years to provide their students with non-academic tools that will qualify them for the world of employment. The inclusion of Accelium tools in their programs has met this need.

User's reviews

“I really liked the concept of using a game as a learning and focusing method, in both the individual and the group level.”

Student in Ruppin Academic Center

"I would like to thank you for my abilities' analysis, I agreed with all of them, and I must point out that the report has ordered things for me and game me a lot of thought for myself.”

A student at Ruppin Academic Center

What responses do you get from the trainees and those in charge of the training?

Nadav: The feedback we get from the market is excellent. The impression that the programs and the digital system leave on the participants is very strong. Positive impressions are regularly passed on to the supervisors of the training through personal feedback or questionnaires.

Managers note the program's unique nature, the technological innovation, the high level of involvement of the participants, and especially the impact that the process had on the participants' way of thinking both in personal contexts and the change in their thinking and approach to professional challenges.

Quite a few clients come to us for or because of the games and are surprised to discover the depth of the programs' learning and personal development processes.

Do you see differences in the aspect of age and gender in working with digital games?

Nadav: There is a tendency to think that there will be a change in people's perception regarding digital games for learning or assessment purposes based on their sex and or their age.

The digital game environment, technology, and even the game mechanics are not trivial things for everyone. So, it is understandable why people possess these assumptions. From participating and conducting dozens of game-based workshops and assessments, I see that people of all ages and genders connect to the game even when it is digital; the challenge stimulates them and inspires intrinsic motivation.

What tips can you give to consultants who are interested in incorporating a game-based assessment as part of their toolbox?

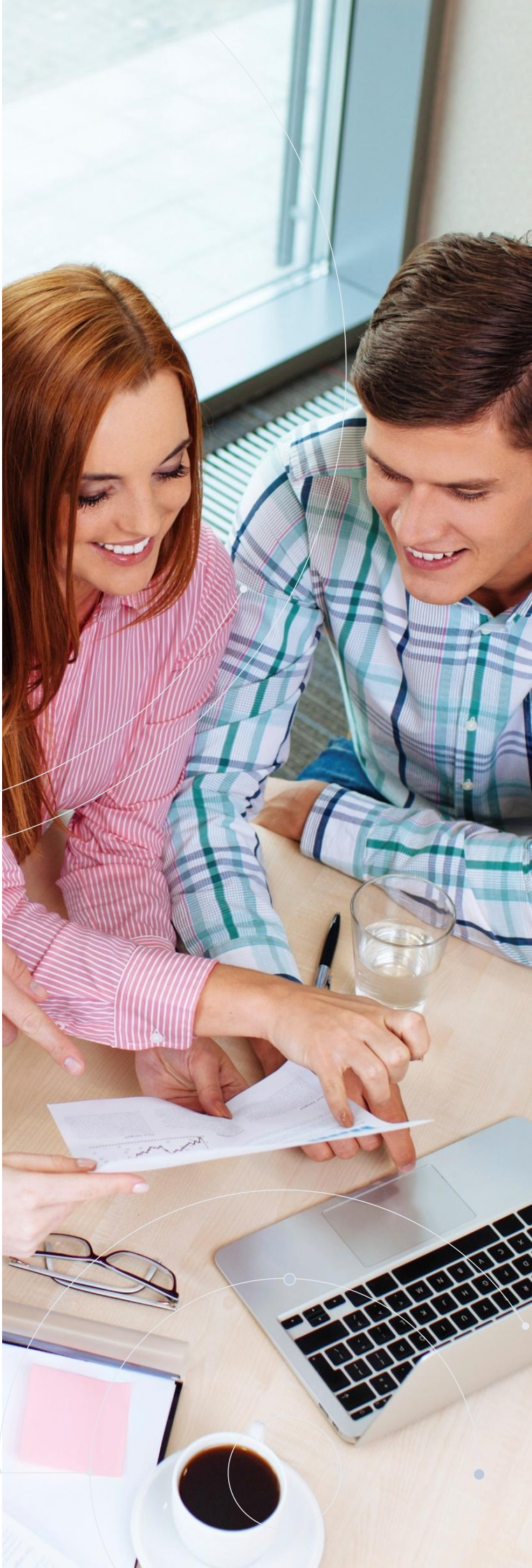
Nadav: Accelium's diagnostic tools produce a rich snapshot of insights and form a rich profile on how managers and employees think and make decisions. These tools enable a high-quality and in depth formative personal assessment. Incorporating the assessment tools makes it possible to create a meaningful dialogue with trainees and learners to develop their abilities and promote them personally and professionally. Corporate and private clients highly appreciate Accelium's game-based assessment tools and are open to working with them and using them in various processes.

My most important emphasis for consultants who want to work with a game-based assessment is to strive to understand in depth what the assessment is based on. It is essential to understand the thinking challenges we face in the game context: The ability to analyze the position systematically and thoroughly. The ability to see the big picture and break free from the concrete. The ability to think about the opponent and understand their perspective. The ability to break free from fixations and more.

Anyone who understands these processes in the game knew how to work with the report effectively.

The feedback we get from managers is very favorable.

When they compare the reports from the system to their knowledge and their personal and professional acquaintance with the examinees, they always state that they were pleasingly surprised to find that the report very reliably reflects the examinees' abilities.

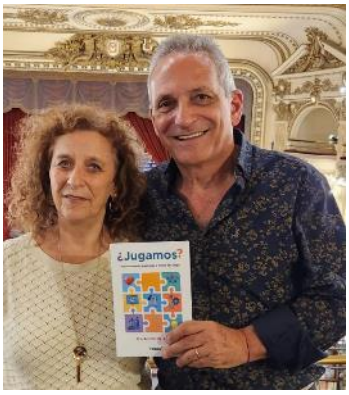


4. Interview with Claudio Guz

The author of Let's Play! Transforming organizations with Games

Claudio Guz is the author of *¿Jugamos? Transformando empresas a través del juego*, a pioneer in integrating game-based methodologies into organizational development. He leads Points of You Latam and Accelium Latam, specializing in innovative training and cognitive assessment tools. With extensive experience in corporate consulting and a deep passion for fostering agility, creativity, and well-being in organizations, Claudio is a sought-after speaker and facilitator.

1. **Please tell us a bit about the different projects and training you do with Accelium method and technology.**
   With Accelium, I focus on creating transformative experiences in organizations, educators, and individuals. My projects range from leadership development workshops to cognitive skills assessments and training programs. We use the Accelium platform to explore critical thinking, problem-solving, and decision-making in a dynamic and interactive way. These tools allow participants to reflect deeply and transfer their learning directly to real-life challenges.



2. **You recently wrote a book on game playing. Share with us the main ideas in the book.**
   My book, *¿Jugamos? Transformando empresas a través del juego*, explores how game-based strategies can unlock creativity, improve decision-making, and foster collaboration in the workplace. It emphasizes that playing is not a luxury but a necessity for innovation and adaptability. The book connects the dots between play, cognitive flexibility, and emotional intelligence, offering practical insights for consultants, HR professionals, and educators.

3. **How was your personal writing experience? What was the writing process?**
   Writing the book was both a rewarding and challenging journey. It began as a collection of reflections and expanded into a structured narrative. I dedicated time early in the mornings to write, often drawing inspiration from workshops and conversations with clients. The process was iterative—testing ideas, seeking feedback, and refining. It also taught me a lot about myself and deepened my understanding of the topics I love.

4. **What are the main advantages that Accelium tools bring to the table, in training and in assessment?**
Accelium tools stand out because they combine rigorous cognitive science with the engaging dynamics of games. They provide immediate feedback, allowing participants to reflect and adapt in real-time. Additionally, the tools are versatile—they work for both individual assessments and team development, and they foster deeper learning by connecting abstract skills with practical applications.

5. **We see the rise of AI innovations everywhere. What are your thoughts on the future of training and assessment connected to AI?**
AI has incredible potential to revolutionize training and assessment. Imagine tools that adapt to individual learning styles in real-time, offering personalized challenges and feedback. However, the human touch remains irreplaceable. AI can enhance the process, but the empathy, creativity, and intuition of a facilitator will always be key in creating meaningful learning experiences.

6. You also conducted some research using the Accelium tests. Please elaborate on the research and the results.
The research I conducted as part of my graduate thesis for the Master's in Cognitive Psychology at the University of Buenos Aires (UBA) aimed to explore how game-based interventions impact cognitive flexibility and decision-making in adults. Using Accelium's tools, we conducted pre- and post-intervention assessments, finding significant improvements in participants' strategic thinking and problem-solving abilities. The results highlight the potential of gamified approaches not only for learning but also for fostering sustainable behavioral change.

The research **included Four Groups:**

1. **Group A (Control Group)**: This group took Accelium test twice without any additional intervention between the tests. The purpose is to establish a baseline for natural progression or lack of change in the measured skills over time.

2. **Group B**: Between the tests, this group received practice workouts using Accelium system, but the games they played were not related to the skills being measured by the tests. This helps to isolate the effect of generic practice that doesn't target the specific skills.

3. **Group C**: This group, in between the first and second test, played Accelium games, which are specifically designed to target the same skills assessed in the tests. The idea is to see if targeted practice using relevant games can improve those specific skills.

4. **Group D**: This group received the same Accelium games as Group 3, but with the added component of mediation in workshops. This suggests that the intervention is more structured, with guided instruction aimed at maximizing the effectiveness of the game-based practice.

Hypothesis:

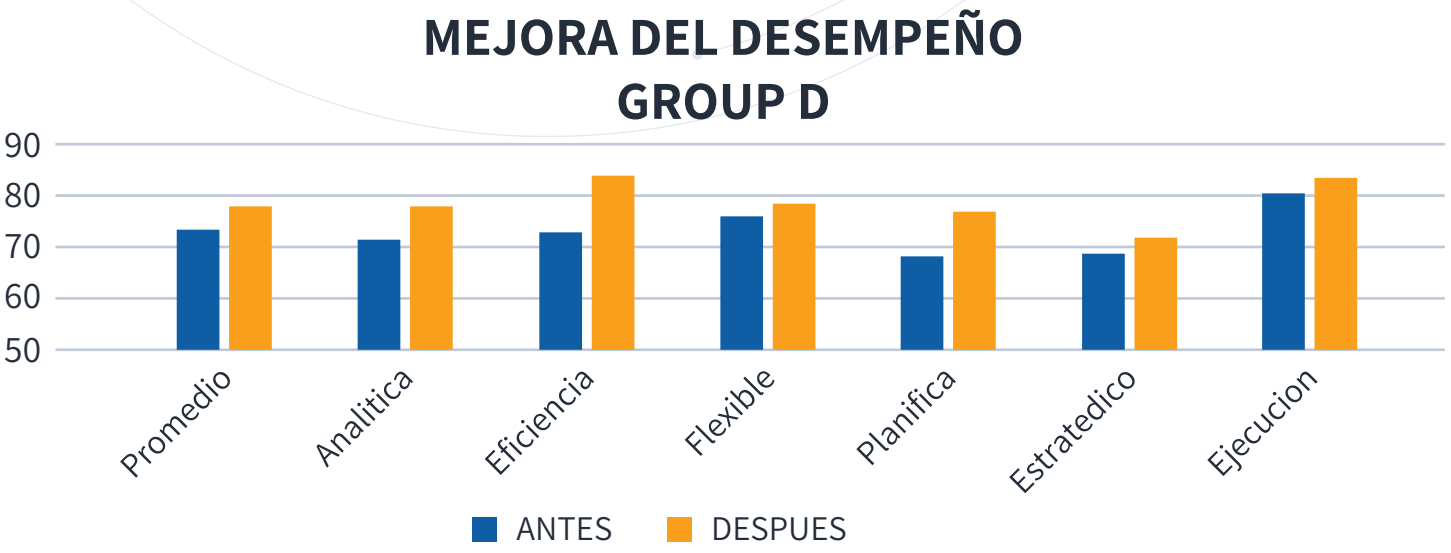
- **Group D** is expected to show the most improvement, as the combination of relevant game practice and mediation in workshops is thought to enhance the learning process.
- **Group C** is expected to improve to a minor degree, as the games directly related to the measured skills should still provide some benefit, but without the additional structure of mediation.
- **Groups A** and B are expected to show little to no improvement, as Group A has no intervention and Group B's practice is unrelated to the skills being assessed.

Results:

- **Group A** showed minimal effect, meaning there was no significant difference before and after the test. This suggests that without targeted intervention, there's no substantial improvement in the measured skills.
- **Group D** demonstrated a significant improvement in skills, with an average improvement of 6% across seven measured skills. This supports the hypothesis that the combination of relevant game practice and structured mediation leads to greater skill development.
- **Group C** likely showed some improvement, although it wasn't as substantial as Group D, as expected. The games were relevant to the skills being measured but lacked the structured mediation that might have helped consolidate the learning.

Conclusion:

The results suggest that a targeted approach (as in Group C) is beneficial for skill development, but adding structured support (as in Group D) significantly enhances the effect. The lack of improvement in Groups A and B highlights the importance of intervention that directly addresses the specific skills being assessed.



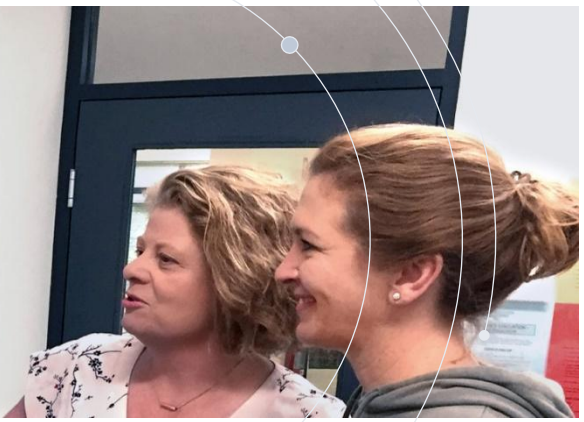
7. **What are your personal plans for 2025? What will be interesting for you to do?**
   In 2025, I plan to expand the reach of game-based learning through new workshops and research projects. I'm particularly interested in exploring how game methodologies can integrate with emerging AI tools to create even more impactful learning experiences. Another goal is to connect with global audiences through speaking engagements and developing a second book that delves deeper into the intersection of play, strategy, and innovation.

5. A Powerful Tool in Education

Chris Ramsden often hears that his work is "amongst Australia's best-kept secrets." Chris has been working with Accelium for the past 13 years, during which time he has demonstrated resilience and dedication while training teachers in the art of metacognition and transference using Accelium's smart games. Chris s high-quality teaching skills have forged purposeful and positive partnerships with innovative schools in Australia. In 2017 and 2018, Chris was chosen by The Educator magazine in Australia where he was listed as among the most innovative educators in The Educator's Hot List! Chris was happy to share some inputs about his experience of using game-based learning and assessment in his schools.

How do your teachers react and respond to the idea of using games as a tool for teaching, learning, and assessing skills?

Chris: During the 13 years I have been teaching Accelium, I have worked with many educators. The attitude of most educators is very positive. I think it stems from their desire to connect with students in a positive and familiar context and the game allows for that in a very natural way. Many are incredibly impressed with the innovation and ease of use of the lesson plans', the level of analysis of the game positions, and the examples and transfer to everyday life. I particularly encourage educators to see the lesson plans and associated tools that students will encounter as the formative ingredients in a "menu." When partnered with their implicit knowledge of the students in their care they are empowered to develop their teaching craft and play the role of a "Master Chef.“ By this, I mean I want them to introduce the relevance of the tools to areas of study at a given time and to choose wisely when and where they would place certain parts of the projects to complement and enhance subjects within the national curriculum requirements, such as Math, or Science or Personal, Social and Emotional Learning.



"Our students have thoroughly enjoyed and been fascinated by the games-based learning which has made them aware of different and new ways of reasoning and given them a language to talk about it. This is fundamental to their coming to appreciate the application of the thinking skills within all disciplines at school. What's more, this extends beyond school to help them with the processes of identifying and solving problems at home too.“

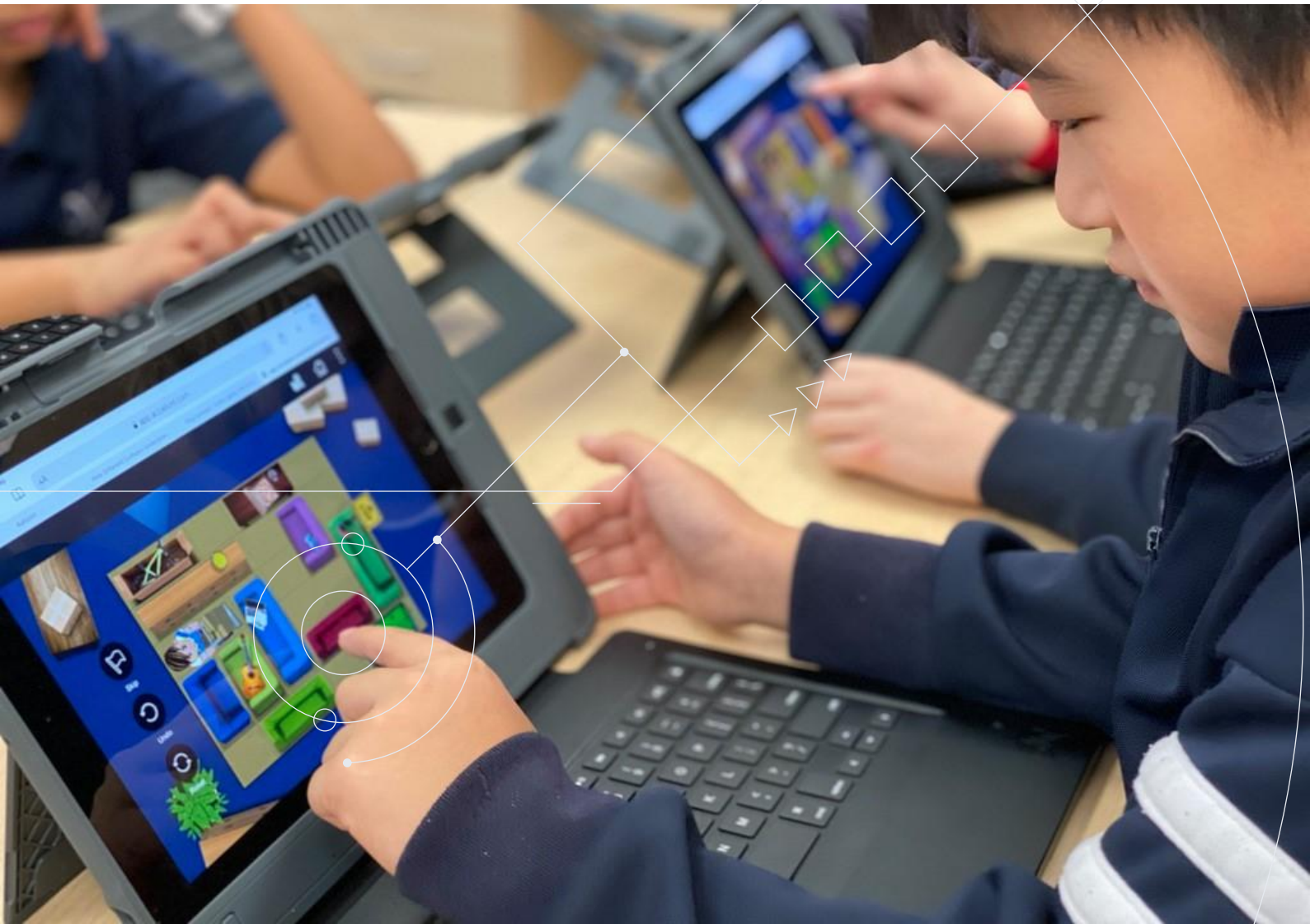
Howard MacPherson - Head of Pembroke Middle School

Can you share your experience of working with the assessment tool in schools? What feedback did you get from teachers when showing them the reports?

Chris: Assessment and the use of data is a key component of education in Australia and the schools and educational systems are seeking ways to assist them in the assessment of 21st century skills. In this context, educators are intrigued to learn that valuable data can be achieved from playing games in a testing environment. The power is that Accelium assessment is a tool that provides a formative snapshot which gives information on aspects of skills development which can be targeted.

"Initially with the testing that the students took part in there was quite a lot of comprehensive data, that as a group within our teaching domains we analyzed and it was really good to highlight different strengths that particular students had, it did show up aspects like being able to work under pressure, being able to think strategically on the spot, elements that sometimes you probably wouldn't have picked up in some students, so it was nice to have that diagnostic, concrete evidence to support what the students were doing, so I found that very valuable."

Daniella Coscia, teacher at Burnside Public School



To what extent does the Accelium program (and the corresponding) fit or match the Australian education system?

This is a common question that is asked of all offerings into schools. Those that have definite links to areas of the Curriculum can express that easier - e.g. Mathletics is an offering that focuses on Math. Accelium is gaining the upper hand in Australia by matching the Australian National Curriculum's general capabilities.

Accelium presents a wonderful opportunity to accelerate the interdisciplinary skills needed to enable students to thrive in any part of their lives. It's pedagogy and methodology lend itself beautifully to the development and transference of 'critical and creative thinking', 'personal and social capabilities' and 'ethical understanding' and the 'attitudes' and 'approaches to learning' of the IB Learner Profile.

"Ingham High places high importance on the development of students' skills for lifelong learning through our school wellbeing program. Accelium compliments this program and we have seen students affirmed in both. Through Accelium we are able to connect the HOMs in "real" learning situations and provide opportunities for students to develop these further. This provides students and staff with a common language that further strengthens the wellbeing messages being embedded in our classrooms."

Jennie Nash - Head of Department Teaching and Learning, mathematics and Wellbeing

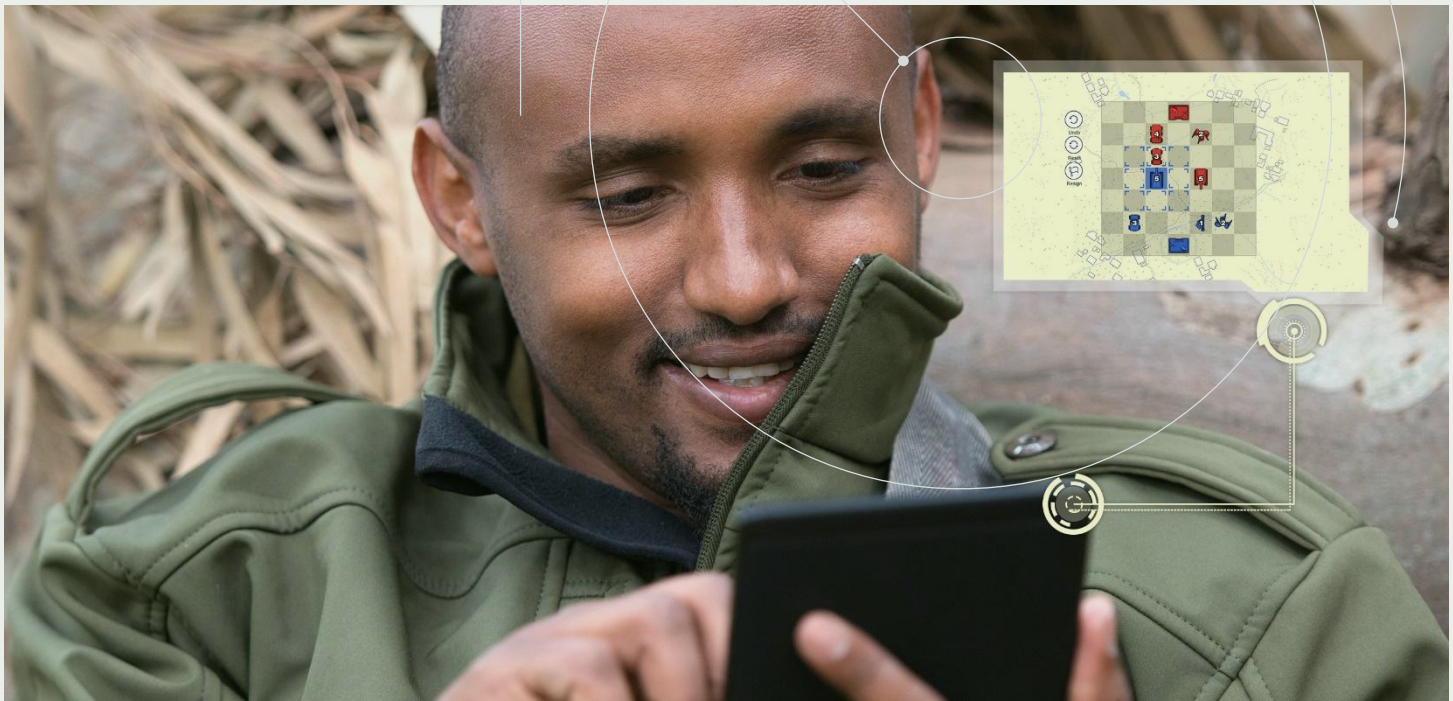
6. Innovation in Organizational Training in the Army

The client: IDF Command & Staff College

The IDF's Command & Staff College trains commanding officers from all military arms who are about to assume battalion-level command. The 9-month long training is mandatory to attain the rank of Lieutenant-Colonel/Commander. Program participants go through comprehensive screening earlier, thus the program' focuses on developing their competencies and equipping them with better tools for command while establishing common language and shared values among officers from all arms of the military.

Program Objectives

- Assess participants' competencies, highlight strong suits and identify weaker skills which require focus.
- Expose participants to innovative thinking strategies, enriching their toolbox with additional methods for problem solving, decision making and critical analysis.
- Help participants make the transition from a company-level, task-oriented perspective to a wider, systemic view, preparing them for the complexities of leading combined arms teams.
- Trigger a personal reflective process, enabling participants to analyze their cognitive and behavioral patterns and identify processes where they could form more effective thinking habits.

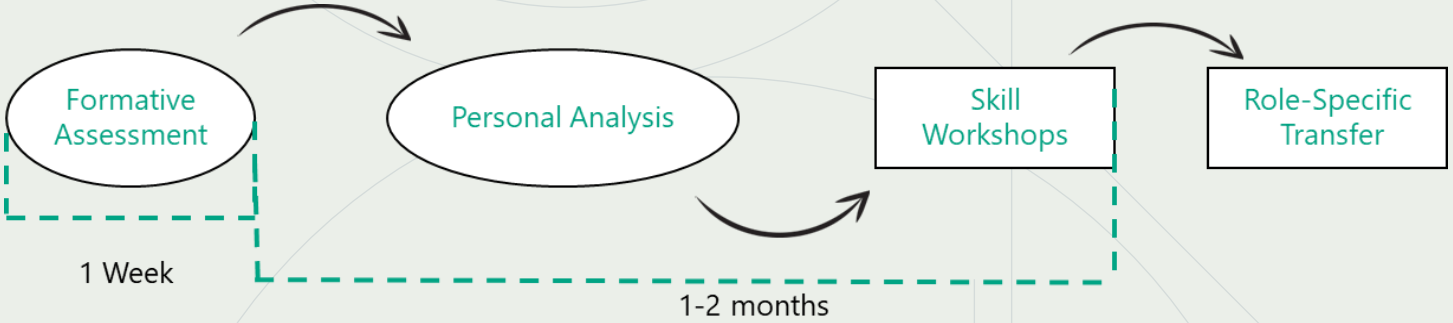


Group Profile

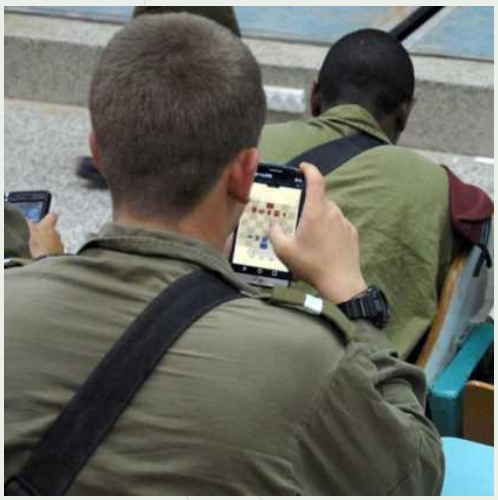
The training brings together future battalion commanders from the Army, Naval & Air Force squadron commanders as well as additional field officers.

	62 Participants	• Army • Naval Officers • Air Force • Intelligence and Communications • Logistics officers
	30 - **40** Y/O	Predominantly male officers

The Process



Personal Formative Assessment



Participants began by taking a comprehensive game-based evaluation, which they had to complete within a week, working at their own leisure from any web-enabled device. They were evaluated on 3 higher-order skills: Analytical Skill, Strategic Thinking, and Execution.

Consequently, officers received a detailed evaluation report, which summarized the assessment's findings and recommended the workshops they would most benefit from taking. The Chief Training Officer was provided with a comprehensive group report to facilitate the planning of the group's training process.

After the initial self-analysis and reflection, test results were reviewed in a 1-on-1 session with an organizational consultant, and were used to define each officer's personal development plan.

Skill Development Workshops

Based on their evaluation and preferences, officers went through 1-4 skill development workshops: Problem Solving, Decision Making, Flexible Thinking and Analysis and Deduction, which combine online coaching on Accelium with an engaging and empowering interactive group discussion.

Participants Feedback

""classic assessment center tests stir up a lot of emotions as their influence on candidates' future is considerable. Participants tended to be more receptive and curious about the feedback they got from the Accelium skill evaluation and that creates a potential for better dialogue" Dr. Motti Klang, the program's organizational development team leader

""I was really intrigued by this analysis, I was curious to find out what it would tell me, and found myself taking the entire test in one morning, no breaks or anything. It was fascinating." Unlike the rest of the tests we take during the course, such as the assessment center, it's easy to take Accelium's test with a 'clean-slate' approach. You put things aside and just enjoy the challenge with no bias, especially since it's fun, and there's nobody else involved, just you and the computer. It simply doesn't feel like a test." "The Accelium report was certainly aligned with the evaluation I got at the assessment center. They both showed that I had strong execution skills and both highlighted a gap in systemic vision- they indicated that I needed to pause more and consider more alternatives before acting." Major N., Program participant

About Accelium Group

Chess masters use the game as a mentoring tool that helps their students develop both cognitively and emotionally, taking away useful strategies that can be applied in various problems and domains.

In 1994 a team of game experts decided to extend the chess-mentoring experience to a variety of strategy games, creating a powerful learning tool that is universally accessible. The innovative methodology born out of this venture was soon being taught in 12 languages and over 40 countries around the world. More than 4,000,000 learners and 10,000 teachers have embraced the Accelium Method to date.

The innovative game-based training and assessment tools inspired by the method combine personal coaching, team workshops, and mobile learning to develop strategic thinking and resilience. They create an engaging experience that inspires learners to continually practice effective strategies, to reflect, and improve their skills and performance.