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The Effects of Simulations on Principals' Training and Professional Self-Efficacy

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Abstract

A simulation is a powerful tool for having an experience in a controlled and safe environment. In education, it has been used within simulation centers. The current study examined the effect of simulations on the professional self-efficacy of school principals in training. Twenty-two master of education students were asked to fill out the Principal's Professional Self-Efficacy Questionnaire before and after taking a course at a simulation center. Results showed a statistically significant increase in all five categories of professional SE. Strong positive correlations were found between the age of the students and each of the measured elements of professional SE in the post-test. Simulations within an organized, supervised process in a simulation center are a powerful tool for the professional development of principals in training.

Keywords: Simulation; Self-efficacy; Principals; Training

Introduction

The current study aims to explore self-efficacy (SE) and professional SE among education professionals studying to become school principals at an education college in northern Israel, and the changes in SE following a team development course in an educational simulation center. The study employed a mix of quantitative and qualitative methods. As the practice of educational simulation is expanding, it is important to examine its contribution to the participants' professional development and highlight its strength and weaknesses.

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The role of school principals is dynamic and ever-changing. In recent decades, school principals turned from senior officials into leaders. They are expected to perform a varied range of roles, adapt to the school's changing needs, manage the school as an autonomic unit, and take responsibility for improving the climate of the school and its students' academic achievements (Kasprzhak & Bysik, 2015). An Organisation for Economic Co-operation and Development working paper (Pont, Nusche, & Moorman, 2018) defined some key responsibilities of modern-day principals: support, the assessment and development of their educational teams, setting goals for their school, gathering feedback and driving improvements, financial management, human resource management and strategy, and external collaborations.

As the range of tasks grows, principals must develop their personal and professional SE in each of these fields. SE is a person's faith in their ability to successfully handle various events and situations (Bandura, 1982, 1995, 1997). It is not a specific set of skills, but rather a person's belief that they can use their skills effectively to achieve their goals under changing circumstances (Brama & Friedman, 2007). Of course, SE alone is not enough; actual abilities and skills are key for any person's professional performance. Yet, SE is a crucial component for success that affects people's behavior in real-life situations. Albert Bandura (1997) suggested that SE can be actively developed and is context-sensitive, for example, a person might feel high SE in a specific situation, and low SE in another.

SE is particularly important when it comes to "soft" skills: human or emotional skills that often do not have a simple or an obvious solution. These skills, which are sometimes referred to, as "emotional intelligence" or "emotional self-efficacy," are crucial for educational professionals, particularly school principals, who are expected to deal with various personalities and situations, inside and outside of school (Hen & Goroshit, 2016; Mahasneh, 2016; Wuch, 2013).

Bandura (1997) specified four main sources for the development of SE. 1) Personal experience: Previous experience of success or failure creates a source of information about one's abilities to handle similar situations in the future. 2) Observing others: Observation enables learning through comparison and deduction. By observing others in different situations, individuals can assess their level of success in handling a similar situation, which might increase or decrease the level of their SE, depending on the nature of their experience. 3) Verbal convincing: SE can be created through verbal communication. The impact of the verbal communication is dependent on the speaker's reliability, their arguments, and so on. 4) Emotional arousal: Physical sensations that are associated with success or failure can affect how a person interprets their success in handling a situation, and thus increase or decrease their SE.

Organizational psychology scholars expanded the concept of SE and proposed the notion of professional SE (Cherniss, 1993), which represents individuals' faith in their ability to handle situations that affect their professional life, including the ability to define goals, create motivation, predict success, handle challenges and external or mental stress, and more.

Studies suggest that SE is best developed through experiential learning, which involves hands-on experience and learning through reflection. This approach is common in fields such as health studies, the military, and management studies, which

use various methods of role plays, simulations, and experiential activities to encourage learners and help them internalize practices (see, for example, Raybourn, Deagle, Mendini, & Heneghan, 2005). Similarly, the professional development of school principals often entails gaining practical experience (Wilmore, 2004). Experiential tools, such as computer simulations, can present the learners with a principal's daily dilemmas (Claudet, 2002; Staub & Bravender, 2014).

Haim Adler (2008) defined the role of a school principal in the Israeli education system as leading education, establishing teaching and learning processes, setting a vision and managing changes, leading and managing the school team, focusing on the individual, and managing the school's connections with the community. As part of their team management role, principals are responsible for the team's professional development, including the creation of new interfaces and the development of teamwork. Assuming that teachers who hold formal and informal professional relationships get the opportunity to share knowledge, successful teaching practices will be able to initiate new activities that improve students' learning and achievements (Southworth, 2000). Hence, principals are encouraged and expected to create learning communities for teachers, as well as manage the educational staff and create a path for their professional development (Adler, 2008). Based on the same principles, Raaya Brama (2004) pointed out five components of professional self-efficacy for school principals: general management SE, leadership SE, human relations SE, external relations SE, and pedagogic management SE.

Over the last three years, the master in education management program at Ohalo College for Education in northern Israel offered a course titled Team Development and Management. In this course, the students take responsibility for their learning by using their individual experience, peer learning, and situational analysis, alongside attending lectures. The course covers issues such as effective teamwork, role division, learning communities, conflict resolution, and more. In the 2018–2019 school year, the course was conducted for the first time at the college's new simulation center in an effort to explore the effects of the simulation methodology on the professional SE of future principals.

The simulation center was established to allow education professionals, principals, and other officials to practice work-related interactions in a safe environment, thus helping them to develop more effective behaviors and responses in real-life situations. The center caters to groups of educational professionals in various stages of their professional development. In each session, a volunteer from the group simulates a relevant real-life situation with a professional actor. The simulation is filmed and screened to the group in real time. After the simulation ends, the volunteer returns to the room and the group discusses the simulation and the volunteer's behavior. The teacher can offer relevant theoretical materials related to the situation at hand, and help the group dissect the interaction and offer insights about the best practices in similar situations (Eizenhammer, Al-Yagor, Ziv, Mevarech, & Rahamim, 2010).

The current study focuses on the effects of the simulations on the professional SE of future school principals, particularly in the aspects of team management and development.

Method

The study examined the effects of the simulation methodology in a simulation center during a one-semester course on team management and development taken by second-year master of education students at Ohalo College in northern Israel. Students participated in ten simulations with various scenarios covering the following themes: roles and team composition, team development, team problem-solving, team decision-making, management challenges, and team leadership.

One of the authors taught the course at the simulation center and the other is a research fellow at the college. Hence, the study was presented as part of the educational process and as an opportunity for self-reflection. The college's institutional review board approved the study, and the participants were asked to sign a consent form.

A total of 22 second-year master of education students (20 females and 2 males), who worked as school principals or were designated for a principal's role, were asked to take part in the study and fill out pre-test and post-test questionnaires about principals' professional self-efficacy. Construct validity was originally (Brama & Friedman, 2007) tested by factor analysis in two separate methods: an exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA). Further validation steps were taken: cross-validation and validity generalization.

Professional SE was examined using the Principal's Professional Self-Efficacy Questionnaire developed by Raaya Brama and Itzhak Friedman (2007) at the Henrietta Szold Institute. The questionnaire consists of 57 statements related to the five components of professional SE identified by Brama (2004, see above): general management SE (GM), leadership SE (L), human relations SE (HR), external relations SE (ER), and pedagogic management SE (PM). Participants were asked to assess their level of efficacy on a seven-point Likert scale (0 = very low; 7 = very high), in addition to a section of general questions concerning demographic data. Brama and Friedman (2007) explored the internal reliability of the questionnaire used in the current study and found it to be very high on all 57 items (α Cronbach = .97). The questionnaire's context used in the current study was similar to the one used to explore its reliability originally. In the post-questionnaire, the participants were also asked to assess the contribution of the simulations to their SE in each specific component and add a verbal explanation to their response.

The average age of the participants was 38.6 (SD = 8.8) years. All had several years of management experience (M = 4.1, SD = 6.5). Twenty-one of the participants served in managerial positions along with their work as teachers; one was a full-time high-school principal. Thirteen participants worked in elementary schools and nine in middle and high schools. Twelve participants belonged to the general education sector, four to the religious-general sector, and three to other sectors. Only four of the participants came from institutions of more than 90 staff members, three came from institutions of less than 20 staff members, and the rest came from institutions of 20–90 staff members.

All participants completed the questionnaire once and then again two and a half months later to allow the detection of an effect. Questionnaires were filled anonymously, but the participants identified the three last digits of their ID number to

allow pairing between the two questionnaires. Values from the two questionnaires were compared using paired student's *t*-tests. Spearman correlation coefficients were computed to estimate the association of survey responses with managerial characteristics. JASP version 0.9.1 was used for all statistical analyses and significance level was set at 2-tailed, $\alpha \leq .05$.

Findings

Quantitative findings

An improvement was detected across all the examined elements: organizational management, leadership, human resources, external relations, and pedagogic management. In the pre-test, the highest-rated element was human resources ($M = 5.494$, $SD = 1.122$), while the lowest one was external relations ($M = 4.625$, $SD = 1.395$). Human resources SE was rated the highest in the post-test as well ($M = 5.989$, $SD = 0.498$). The largest difference between the pre- and post-test results was found in external relation management (0.675), followed by human resources (0.495). Table 1 presents the descriptive statistics in more detail.

Table 1. Descriptive statistics of professional SE components: pre- and post-test

	N	Mean	*SD*	SE
2GM	19	5.158	0.673	0.155
GM	20	4.779	1.149	0.257
2L	19	5.397	0.722	0.166
L	20	5.067	1.111	0.248
2HR	19	5.989	0.498	0.114
HR	20	5.494	1.122	0.251
2ER	19	5.300	0.963	0.221
ER	20	4.625	1.395	0.312
2PM	19	5.395	0.936	0.215
PM	20	4.925	1.370	0.306

Notes: GM = general management; L = leadership; HR = human resource; ER = external relations; PM = pedagogical management; 2GM, 2L, 2HR, 2ER, 2PM = same categories but in post-test

A paired-samples *t*-test was conducted to compare the pre- and post-test results in the different SE components. The results are presented in Table 2. A tendency toward a significant difference was found in the GM component between the pre- ($M = 4.779$, $SD = 1.149$) and post-test results ($M = 5.158$, $SD = 0.673$); $t(16) = 1.807$, $p = 0.09$, Cohen's d effect size = 0.438. A significant difference was found in the L component between the pre- ($M = 5.067$, $SD = 1.111$) and post-test results ($M = 5.397$, $SD = 0.722$) results; $t(16) = 2.882$, $p = 0.011$, Cohen's d effect size = 0.699. A highly significant difference was found in the HR component between the pre- ($M = 5.494$, $SD = 1.122$) and post-test results ($M = 5.989$, $SD = 0.498$); $t(16) = 3.124$, $p = 0.007$, Cohen's d effect size = 0.758. A significant difference was also found in ER component between the pre- ($M = 4.625$, $SD = 1.395$) and post-test results ($M = 5.390$, $SD = 0.963$); $t(16) = 3.105$, $p = 0.007$, Cohen's d effect size = 0.753. Finally, a signifi-

cant difference was also found in the PM component between the pre- (M = 4.925, SD = 1.37) and post-test results (M = 5.395, SD = 0.936); $t(16) = 3.43$, $p = 0.003$, Cohen's d effect size = 0.832.

Table 2. Results of paired-samples *t*-test for different elements of self-efficacy

					95% CI for Cohen's *d*	
	t	*df*	*p*	Cohen's *d*	Lower	Upper
2GM–GM	1.807	16	0.090	0.438	-0.067	0.931
2L–L	2.882	16	0.011	0.699	0.158	1.223
2HR–HR	3.124	16	0.007	0.758	0.207	1.291
2ER–ER	3.105	16	0.007	0.753	0.203	1.285
2PM–PM	3.430	16	0.003	0.832	0.268	1.377

Notes: Student's *t*-test; GM = general management; L = leadership; HR = human relation; ER = external relation; PM = pedagogical management; 2GM, 2L, 2HR, 2ER, 2PM = same categories but in post-test

Strong positive correlations were found between many of the measured items, and they are presented in Table 3. Age was found to be strongly and significantly correlated with each of the measured components of SE in the post-test (Pearson's r ranged from 0.494 to 0.585, $p < 0.031$). The GM component was found to be strongly and significantly correlated with L and HR components in both the pre- and post-tests (Pearson's r ranged from 0.615 to 0.852, $p < 0.005$). This was also the case with the ER component, which was found to be strongly and significantly correlated with the PM, L, and HR components (Pearson's r ranged from 0.62 to 0.836, $p < 0.005$). The L component was found to be correlated with the HR component in both the pre- and post-tests (Pearson's r ranged from 0.594 to 0.901, $p < 0.01$).

Table 3. Statistically significant Pearson correlations between the main variables

Variables	Pearson's *r*		*p*
Age–2GM	0.494	*	0.031
Age–2L	0.585	**	0.009
Age–2HR	0.506	*	0.027
Age–2ER	0.696	***	< .001
Age–2PM	0.577	**	0.010
GM–L	0.852	***	< .001
2GM–2L	0.848	***	< .001
GM–HR	0.749	***	< .001
2GM–2HR	0.615	**	0.005
ER–PM	0.836	***	< .001
2ER–2PM	0.728	***	< .001
HR–ER	0.700	***	< .001
2HR–2ER	0.712	***	< .001
L–HR	0.901	***	< .001

Table 3 (continued)

Variables	Pearson's *r*		*p*
2L–2HR	0.594	**	0.007
L–ER	0.788	***	< .001
2L–2ER	0.620	**	0.005
GM–ER	0.669	**	0.001
GM–PM	0.818	***	< .001
L–PM	0.879	***	< .001
L–2GM	0.558	*	0.020
L–2HR	0.574	*	0.016
HR–PM	0.826	***	< .001
HR–2GM	0.579	*	0.015
HR–2L	0.711	**	0.001
HR–2HR	0.709	**	0.001
ER–2L	0.578	*	0.015
ER–2ER	0.525	*	0.030
ER–2PM	0.501	*	0.040
PM–2L	0.577	*	0.015
PM–HR	0.625	**	0.007
PM–2ER	0.565	*	0.018
PM - 2PM	0.711	**	0.001

Notes: * = $p < .05$, ** = $p < .01$, *** = $p < .001$; GM = general management; L = leadership; HR = human relation; ER = external relation; PM = pedagogical managemen; 2GM, 2L, 2HR, 2ER, 2PM = same categories but in post-test

Qualitative findings

As mentioned, the post-test questionnaire included a general assessment concerning the contribution of the simulation center to the development of different SE components. In two of the components—pedagogic management and external relations—a small majority of the participants said the course did not contribute to their SE, mainly because the focus of the simulations was elsewhere. Some, however, did manage to relate the simulations to these aspects as well.

Pedagogic management self-efficacy

Out of the 20 participants who completed the post-test questionnaire, 12 wrote that the incorporation of simulations in the course did not contribute to their SE in pedagogic management. Most of them explained that the simulations in the course were irrelevant for this specific skill. One of the participants wrote: "This field requires long-term practice, and I think it cannot be experienced in a single simulation." Another participant wrote that the course did not refer directly to pedagogic management, but the simulations did offer indirect insights into this field (yet, his answer was still "no"): "The simulations included almost no reference to pedagogic manage-

ment, and this is why I chose 'no.' But I believe that any simulation can reflect on other life and work situations."

Eight participants wrote that the course contributed to their SE in pedagogic management. Three mentioned specifically their work with teachers, team management, and the suitability of teachers to their roles. One of them wrote:

> When I watched simulations of a principal giving feedback to a teacher or dealing with an issue of inadequacy or role definition, it made me think how I would do it, and it emphasized the importance of the principal's involvement in every field, including pedagogy. At the end of the day, pedagogy is a key field in every school, and everything a principal does must serve pedagogy.

Another participant wrote about pedagogic leadership: "The simulations emphasized the importance of being a pedagogic leader and promoting innovative pedagogy." Another mentioned the balance between pedagogic excellence and human relations: "On the one hand, empathy and sensitivity are important; on the other hand, we must achieve our goals and objectives for the benefit of the school."

External relations self-efficacy

As for SE in external relations, 11 out of the 20 participants wrote that the course did not contribute to their SE in this component. The main reason was that the simulations did not refer to this field. The nine participants who chose "yes" said that while the simulations did not refer directly to external relations, the extra practice of human resources and interpersonal behavior affected their SE through a process of deduction from one case to another. One of them wrote:

> Handling conversations and developing connections with external relations is not that different from handling relationships inside the team. And so, the skills I have gained through the simulations can help me in developing more positive, effective external relations … It helped me because I learned how to make the right decision under pressure without infringing the rights of others.

As for the other three components—human resources, leadership, and general management—most of the participants noted an improvement following the simulation course.

Human resources self-efficacy

Nineteen out of the 20 participants wrote that the course improved their SE in human resources, which seemed natural because the simulations were created as interpersonal interactions. Some mentioned the general contribution of practicing and reflecting on a real-life situation: "The simulations allowed me to refine my behavior, my initial reactions, my natural instincts, and learn when to stop and how to act differently." Others mentioned the option of exploring different reactions. One participant wrote: "We could see different types of people and styles, which allowed us to learn about the relationships." Another noted: "The simulations offered a variety of ways to deal with people."

One of the participants mentioned that he understood the importance of acquainting himself with the person in front of him: "The incorporation of simulations

highlighted the fact that I need to know the background and understand the person standing in front of me so I can 'get to them' and lead to the desired changes." Another participant mentioned the importance of human relations in being a leader: "It was clear that a leader needs to know how to handle human relations to succeed in their mission."

Some participants noted that the simulations helped them understand the importance of striking a balance between authority and containment, or between relationships and tasks: "Alongside empathy and sensitivity, I also learned to set demands and say things in the right way, on time, instead of leaving them unsolved," said one. Another noted: "The different situations highlighted the different possibilities of approaching, accessing, and assisting staff members, of maintaining empathy alongside authority, with a different balance between them based on the situation." Another argued: "It highlighted the fact that I can be nice while still sticking to my requirements and not settling over my professional demands."

Leadership self-efficacy

When asked about SE in leadership, four participants wrote that the course did not contribute to their leadership skills. One of them wrote that the simulations did not focus on this aspect; another mentioned: "I think that leadership SE is an inherent part of my personality, and nothing about the simulations made me see a specific type of leadership or connect to it." The third noted that she did not get the chance to participate in this type of simulation: "I was not affected because I did not get the chance to experience such a simulation. I think everyone should get the chance to experience scenarios they feel uncertain about."

Sixteen participants wrote that the course did contribute to the leadership component of professional SE. Some mentioned the knowledge they accumulated about different types of leadership, the general importance of leadership, long-term plans, and team mobilization. One of them wrote: "The simulations allowed me to watch leaders in different situations, different types of leadership, and different reactions to a situation, according to the problem, dilemma, and the specific leader." Another noted: "It helped me lead the team by changing their own will, based on ideological and professional commitment." Another participant argued: "The simulations helped me think and plan for the long term." Some participants mentioned the opportunity for self-reflection and the identification of strengths and weaknesses. One of them wrote: "The participation in the simulation made me acknowledge my weaknesses alongside my strong points and try to improve my reactions." Another mentioned: "When I took part in the simulation, I could see myself better, see the way I choose to talk to people."

General management self-efficacy

All participants found the course useful in terms of their general management SE. The participants' explanations about the course's contribution to the general management component of SE can be divided into three main themes: experience, perspective, and self-reflection. Experience is an acknowledged source of SE, and many of the participants mentioned it as a contributing factor. Handling different situations

from daily life in a safe environment of trial and error was valued by many of the participants. Comments included: "Experiencing is always helpful." "It simulated different situations from the life of a principal in general." "The simulations made me feel I am dealing with the issue and think about how I could really solve it, not in theory, in practice."

Furthermore, many of the participants wrote that experiencing simulations (or watching others in simulations) allowed them a broader perspective and helped them understand different perspectives and reflect about various optional reactions. For example, one participant said: "The use of simulation made me look differently at situations I encounter in the kindergarten. I could also look at situations from a few different angles." Another wrote: "The simulations allowed me a wider perspective of the managerial aspect."

Finally, some of the participants mentioned the simulations as facilitating self-reflection. By experiencing simulations or watching others, the participants were able to reflect on their instinctive behavior and its effectiveness, while also considering ways to improve their reaction and behavior. One of them wrote: "When I was watching situations that were similar to those I encountered at work and different ways to resolve them, I could think about my reactions in these situations and wonder if I could have handled this situation." Another mentioned: "The simulations allowed us to better understand our strengths and weaknesses and improve." Yet another participant noted:

> The simulations affected my self-efficacy in general management by making me look at my behavior, reflect on my behavior in this situation, think how I would react based on my knowledge about myself and the situation to create the desired situation and achieve my goals.

Discussion

Studies about principals' professional development (McHatton, Boyer, Shaunessy, Terry, & Farmer, 2010; Orr, 2011) found that the training contents and methods affect both the learning and the professional ability of future principals. These studies also mentioned that professional SE is crucial for the principal's professional success and that this SE is created through a training process. The course described in this article, Team Development and Management, was part of the graduate program in educational management (designated for future principals of educational institutions). It was designed to provide future principals with team leadership skills (perceptions, knowledge, and tools). To improve these skills, the course focused on creating professional SE among the students and making them feel confident in their ability to perform their future roles, including team leadership, team management and development, human relations, and community relations (Adler, 2008), using the simulation center's platform. The current study attempted to detect the impact of the use of the simulation methodology on the development of SE among future principals and managers of educational institutions. The results showed significant positive changes across all aspects of professional SE after simulations were used during one course.

Several issues need to be discussed. First, the increase in professional SE of the course participants may be explained by the fact that the four sources of SE men-

tioned by Bandura (1997) (personal experience, observing others, verbal encouragement, and physiological-emotional arousal) are all addressed through the methodology of a simulation. The learners create their simulations, based on situations from their daily life, and practice their reactions in a safe environment, while developing a wide variety of possible reactions. The learners experience simulations while also watching others and offering them feedback, thus expanding their insights, perceptions, knowledge, and tools. By sitting among peers, experiencing and watching their colleagues, the students can assess and improve their abilities to perform similar tasks in the future (Salman & Fattum, 2019), while at the same time improving their confidence in leading a situation and achieving the desired results (Aran & Zaretsky, 2017).

Second, the simulations reflected real-life situations that were described by practicing principals and allowed the learners to experience and handle the situations while being trained for their future role (by participating in the simulation or watching a peer). The use of simulation is common in the fields of military and medicine—where it is important to practice necessary reactions to save lives. It was found that simulations were more effective in developing approaches compared to lectures, for example (Dekkers & Donatti, 1981). While this study did not have a control group of students who took the same course in a different setting without simulations, it seems the use of the simulations can explain the rise in professional SE reports between the pre-test and the post-test.

The responses of subjects in the general qualitative assessment showed that the simulations enabled the participants to identify their level of managerial skills, compare themselves to others, and thus improve their SE. This finding is in accord with a previous study (Orr, 2011), which also found that learners' SE can be increased through a training process that includes job-related tasks. The feedback from actors, peers, and the moderator helped the participants to better assess their abilities. The exposure to an encounter based on conflict and the ability to "be" in the moment and then view themselves on tape and get feedback creates an emotional experience. When it happens in a moderated, safe way, it allows the participants to deal with their successes as well as failures. The rise in SE affects the graduates' perceptions of their ability to deal with future issues of team management and development.

Third, it should be mentioned that a rise was detected even in professional SE aspects that were not directly addressed in the course, such as pedagogic management or external relations, which may be explained by previous knowledge or experience, or a gap between the learners' assessment of their knowledge and their actual knowledge. Other studies mention similar findings (McHatton et al., 2010).

The fourth issue is the timing of the post-test, which was conducted immediately after the end of the course, since collecting data during the training period may not have given ample time for the simulations to reach their full range of effect. Therefore, a future study should concentrate on re-examining the level of SE after the participants have had some practical experience in management and look at their ability to relate the use of simulations to their actual performances. Such a study may be able to reinforce the findings of previous studies, which suggested that new principals derive most of their SE from their training (Larsen & Derrington, 2012).

Finally, as far as the authors know, the current study is the first to offer a prospective examination and documentation of the impact of an organized, supervised process in a simulation center on the SE of students in education management. While the sample in this study was fairly small, the findings suggest that simulations should indeed be incorporated into the process of principals' professional development. This integration creates motivation and enjoyment and thus may meet the learners' expectations, increase their motivation, and, most importantly, shape principals with a higher SE and better performances.

Website

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