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An investigation of how leadership styles influence the effectiveness of Mathematics classroom management.

[1,]Abigail juta, and [2,]obediah mumanyi, [3,] Dr. o. mumanyi, dr a juta,
[1,]*Educator, Lyttleton Manor High School.*
[3,]*Educator, Halfway House Primary School*

ABSTRACT: Institutions employ various leadership styles to enhance goal achievement. This has led to the field of leadership enormously developed with researchers struggling to quantify what would make a great leader. Hence, in an academic setting such as a school, leadership can be identified at various platforms with educators also being viewed as crucial classroom leaders who play a vital role globally. The paper investigated how the leadership styles enhance effective classroom management. Findings led to the exploration of three styles namely: Autocratic, Democratic, and Permissive during research carried out in Gauteng Province of South Africa on effective management of Mathematics classrooms. Qualitative data was collected through semi-structured interviews of four Mathematics Heads of Departments and four-educator focus group discussions consisting of five educators each from four purposively and conveniently selected high schools in Gauteng Province of South Africa. Findings indicated that all three indicated leadership styles can be utilised situationally to enhance effective classroom management. Recommendations made include equipping educators with relevant skills such as ICT which is a critical necessity especially these days where the Coronavirus pandemic has led to the closure of many academic institutions globally. As such, various desperate adjustments in terms of school attendance are increasingly being adopted such as attending on alternate school days, which further necessitates the employment of relevant leadership styles.

KEY WORDS : Classroom management, Leadership style, Democratic, Autocratic, Permissive

I. RATIONALE FOR THE STUDY

Learner performance in South African schools is a cause for concern, specifically in Mathematics (Bosman & Schulze, 2018). This could be attributed to limited educator content knowledge and ineffective employment of leadership styles. (Kriek and Grayson, 2009). Mathematics, Science and Technology education has been a priority in South Africa for several years (Kriek & Grayson 2009; McNaught, 2018). The World Economic Forum (2017) report ranked South Africa 128 out of 137 countries on global competitiveness in Mathematics and Science. Performance is therefore, to some extent influenced by the school leadership and the quality of classroom management. (Juta & Van Wyk, 2020). This empirical study sought to address the question: "how do the leadership strategies of both the school management team and Mathematics educators influence the effectiveness of Mathematics classroom management"? The findings revealed that as leaders, Mathematics educators should improve on time management, particularly by arriving on time for lessons and spending the allocated time on the Mathematics tasks.

This calls for professionalism on the part of the Mathematics teachers and for greater monitoring by the SMT's, for example 'managing by walking around' especially after break times to ensure punctuality of both teachers and learners. There is great need for SMT's to lobby for ICT equipment/resources the ease the teachers' burden in Mathematics lessons delivery, once the requisite training has been afforded to the teachers. ICT such as GeoGebra will help in explaining abstract concepts such as 3-D problems. It will also capture the learners' attention in ways that reduce disruptive tendencies. The teaching strategies can therefore engage learners into meaningful learning. These observations augur well for effective Mathematics classroom management and for the use of

more democratic leadership styles. Among other pertinent findings this paper contributes to the ongoing research conversation by adding the dimension of the need for ICT usage in Mathematics teaching and training particularly in the covid-19 era. It can be argued that when the leadership style is right then classroom management will be effective and this will lead to improved goal achievement (Aldridge, Halpen & Fitzpatrick, 2002). Hence, this study should shed some light on the leadership styles that best influence Mathematics classroom management in ways that promote improved learner performance as indicated by research participants and supported by various authorities. Furthermore, the study is expected to generate discourse on best management practices that can be employed to enhance learner performance not only in Mathematics but across the curriculum.

II. CONCEPTUAL FRAMEWORK

Social capital theory This study adopted social capital theory as a conceptual framework. The success of institutions is dependent on its social capital base. Social capital has been defined differently (Adler, 2001; Claridge, 2004) as consisting of the human resources, the knowledge that they have and the information technologies that an institution possesses and uses. Woolcock (1998) viewed social capital as the social relationships, trust, norms, and networks that people in an organization rely on to solve problems or attain organizational goals. Fukuyama (1997) cited in Claridge (2004) viewed social capital as people working together for common purposes. In a school set up the management, educators, the technology, and learners constitute the social capital. Grootaert & Bastelaer (2002) argue that as a conceptual framework, social capital fits different social entities and can be very context specific. In this study it was deemed relevant to use social capital theory to investigate how leadership style can effectively enhance Mathematics classroom management. One of the benefits of social capital is the potential improvement in educational performance (Claridge, 2004). In a school set up the Mathematics educators' knowledge, skills, and experience constitute important dimensions of social capital that can be exploited to enhance effective classroom management. A school's social or human capital can be boosted through regular staff development programmes (Ogbonnaya, 2011). These dimensions should ideally translate into improved learner performance (Makore, 2015). As such, the classroom environment exerts considerable influence over learner attitude, behaviours, curriculum coverage rate and achievement in education (Soheili, Alizadeh, Murphy, Bajestani, & Ferguson, 2015; Mji & Makgato, 2006). It is therefore crucial to ensure the correct implementation of a suitable leadership style when managing classrooms.

Review of related literature: Leadership styles Leadership is the process where one person influences others by creating a specific climate or environment (Kushata, 2018). The role of a leader is an essential complement to that of an educator. In a classroom set up the educator is the leader. When a leader displays certain behaviour consistently it becomes a leadership style. Although many definitions of leadership exist, they all share one aspect in common, namely influence. Leaders will influence their subordinates towards attainment of the set goals of the organization - in this case the school. Hence, effective leadership is dependent on the knowledge or acceptance of the leader's authority during classroom management (Shonubi, 2012). In addition, everything a teacher does and says impacts on the classroom atmosphere which is relative to the educator's leadership style (Nakamura, 2000). The notion is supported by Mji and Makgato (2006) who propound that teaching strategies, content knowledge and motivation depend on the educator management style. The leadership styles can therefore be deduced from the educator's attitude towards the teaching task and the learners involved.

Some commonly used leadership styles include: the democratic, permissive, bureaucratic and autocratic (Yukl, 2010). Ideally these styles should reflect the extent to which the leaders are directive, supportive, participative, and achievement focused. The autocratic leadership style was indicated by Kruger and Van Schalkwyk (2016) as a common teacher-centred approach utilized by Mathematics educators. This leadership style is characterised by the active participation of the educator being in control while learners are passive recipients. There is more of leader-follower relationship. Furthermore, there is less or no learner freedom. The learner receives formal but

educator-administered interventions. Without learner participation, it can therefore be regarded as an educator knows-it-all form of leadership. The educator controls the behaviour of the learners, sets the classroom rules, and uses rewards and punishment for goal realisation (Sahin, 2015). The educator's role and directions constitute the greater part of the teaching-learning situation. It is entirely a one-way form of communication whereby the educator keeps to a fixed schedule, drawing up classroom rules and procedures to be followed. As a result, learner participation is limited to listening, working and performing as per instruction. This is akin to what Ngoepe and Nyaumwe (2012, p.84) said: "An African cultural maxim that encourages obedience through passivity of adult authority that 'children should be seen and not heard' may permeate into some (Mathematics) teachers' classrooms". Autocratic leadership style can be very effective for ill-disciplined learners, when introducing a new concept or when demonstrating a task such as the construction of shapes in Geometry. This approach however, has disadvantages such as suppression of learner freedom, disorganisation and is also prone to lack of learner co-operation. Closely related to the autocratic is the bureaucratic leadership style, where the educator follows strictly the lines of authority as well as the rules in management and decision making. Although these two leadership styles tend to be rigid and inflexible, they are widely used because of their merits. Both are results oriented. The effectiveness of the autocratic leadership style therefore tends to depend mainly on educator characteristics and professional skills such as strong subject knowledge, creativity in addition to being a strong and sound communicator. The permissive leadership style is learner centred. Learners are in control of what is happening, with little direction from the educator. The permissive management style is classified as a lazy-teacher management style or non-interventionist style which may yield non-productive outcomes (Sahin, 2015). It therefore over-emphasises the human aspects of the teaching and learning situation (Shonubi, 2012).

In support, Weinstein and Romano (2015) state that the learners in these classrooms decide what they want to do, set their own rules, and create their own classroom spaces. Hence, learner happiness tends to take preference over the subject content or task accomplishment. Similarly, Soheili et al. (2015) allude that this leadership style is characterised by a lot of freedom but no order. It is vital to note that the educator's weakened control may negatively impact goal achievement. On the other hand, the permissive leadership style strengthens learner-to-learner relationships and may be very effective when employed to a high achieving academic class. Overall, the approach can be viewed as marred with disorganisation and as a result it is labelled as a non-productive leadership style. It can be time-consuming and a challenge to manage. Furthermore, it can yield undesirable behaviours such as noise, disruptions, and incomplete classwork.

The democratic leadership style is more interactive. The style utilises respect and encouragement for goal achievement (Soheili et al., 2015). Here, the educator and learners are actively participating in constructive ways since the style incorporates both order and freedom. As such, the educator applies professional skills to earn a balance between the task and the human aspect to enable learners to participate confidently whilst simultaneously receiving the educator's appreciation. The notion is supported by Shonubi (2012) who explained democratic leadership style as a high people-oriented leadership which is positively related to the improvement of learner performance due to its charismatic features of inspirational motivation. This calls for an educator who is knowledgeable, accommodates individual differences, maintains order in the classroom, and meets the needs of the learners (Grapragasem, Krishnan, Joshi, & Azlin, 2016). The democratic leadership style enables educators to combine both firmness and kindness for the encouragement of learner participation as well as goal attainment. Hence, the style provides room for active learner participation which is vital for problem solving or for various calculations in both Algebra and Geometry. Also, Sanchez-Famoso, Maseda and Iturraldo (2014) observed that the leadership style assist in enhancing an innovative climate in an organization and supports intellectual development. Leaders can develop close ties and high levels of trust with team members, which encourages the members to take risks in creating new knowledge. These arguments are relatable to the Mathematics educators' classroom management setting. Research also shows that relationships matter: the quality or warmth of the

educator-student relationship is a good predictor of academic and behavioural outcomes, especially for students with behavioural problems (Woolfolk, 2010; Pianta, Belsky, Vandergrift, Houts & Morrison, 2008). It is possible for a Mathematics educator to be predominantly on one of these and display attributes of the other leadership styles as and when necessary.

Effective classroom management : Effectiveness in Mathematics teaching can be viewed from many dimensions, but the key is performance in three areas of academic endeavour namely curriculum, pedagogy, and evaluation (Banks, 1982). Curriculum deals with content coverage, pedagogy with methods of curriculum transmission and their appropriateness. Evaluation helps to identify how well learners have mastered the requisite concepts, their weaknesses, and mistakes. Juta (2019) contends that good Mathematics teaching cannot be separated from effectively managing classes. Studies on mathematics achievement in developing countries have shown that learners' performance in Mathematics is often well below expectations (Essien, 2018). Effective classroom management therefore calls for educators who have good interpersonal relations and can build trust and co-operation with both learners and parents (Bulls & Solity; 2013). In addition, Mathematics educators should spend time on tasks: this helps to stave off disruptive behaviours and ensures learners complete tasks as instructed. From an economic perspective, time on task is a school resource which when used in combination with other inputs influences the school's productivity and learner achievement (Fisher, 2009; Karweit, 1983). It is imperative that learners' time is used efficiently by ensuring that they remain engaged in learning. In this regard, Fullan, Hill & Crevola (2006) caution that what the teachers do (or do not do) with the allocated instructional time is critical in determining academic achievement.

Accordingly, there have been calls for professional development training – both preservice and in-service – in skills and strategies that increase the time learners devote to relevant academic learning. To achieve this, educators should be motivated, knowledgeable, skilled, and up to date with Mathematics content, methods, and developments in information and communication technology (ICT). As Browning (1990) observed, ICT has become a pervasive phenomenon in most workplaces, so Mathematics educators will do well to embrace it. In addition, Etuk, Afangideh & Uya (2013) call for a relaxed classroom atmosphere that is free from threats and anxiety as a prerequisite for generating learner interest and a positive attitude towards the subject. One teaching method that Mathematics educators rarely use in their lessons is learning in small groups. Collaborative learning boosts student motivation, encompasses active learner-educator participation and improves student achievement (Fisher, 2009). Unfortunately, many educators shun this method because of their preoccupation with classroom control and individual accountability. The Corona virus era and its aftermath calls for more innovative teaching that can be enhanced by the utilisation of information technology.

This augurs well for effective classroom management and helps to produce quality learners ready for life and work in a volatile world. A prerequisite for greater implementation of information technology is the sufficient training of educators in its use (Egbu & Botterill, 2002). Some studies have focused on how learners are affected by having several effective or ineffective educators in a row. Sanders & Rivers (1996) found that these effects (especially of poor classroom management and teaching) are cumulative and residual, and that good teaching later cannot erase all the deficits. Effective Mathematics classroom management therefore calls on educators to deal with a wide range of learner abilities and challenges. Woolfolk (2010; p.8) suggests educators to 'adapt instruction and assessment to student needs, to make the most abstract Mathematics concepts real and understandable to their learners, and to take care of the emotional needs of their learners'. This relays a vital message to educators who are reflective and are prepared to break from the routine when the situation calls for change and are competent to choose a suitable leadership approach to enhance goal achievement.

III. METHODOLOGY

The qualitative research design was adopted in this study as it is interpretive and has the capability to provide for multiple realities or interpretations of a single event (McMillan & Schumacher, 2011; Merriam, 2009). Some authorities contend that the strength of qualitative research is "in enabling naturalistic inquiry, in which observation techniques result in a more natural approach than do the tests and surveys often used in quantitative approaches" (Guba & Lincoln, 1985; in Merriam, 2009; p.39). This study employed purposive and convenience sampling to identify participants from four selected schools in Gauteng Province. The researchers explained the data collection process to the participants and gave assurance on confidentiality simultaneously indicating that participants had a right to withdrawal of their participation at any time. Mathematics heads of department (HOD's) were coded as HA, HB, HC and HD while the focus groups Mathematics educators were coded as FGA, FGB, FGC and FGD. Individual focus group participants were each allocated a number (such as FGA1 or FGC4). Data was collected from HOD's through face-to-face semi-structured interviews and that from Mathematics educators through focus group discussions. First-hand qualitative data was therefore collected from natural settings through interviews and focus group discussions (Creswell 2011). Altogether there were 4 HOD's and 20 educators. Data collection time was scheduled after school hours and each interview took at least an hour until data saturation was arrived at. In order to answer the main research question, sub questions on the major constructs of managing, classroom and mathematics were further elaborated during discussions with participants. Interview questions were limited to the following, (a) "Which activities are managed in Mathematics classrooms?" (b) "What challenges are educators facing when managing Mathematics classrooms? (c) "How can these challenges be addressed?" What strategies are employed for effective management of Mathematics classes?" The interview proceedings were audio-recorded with the consent of the interviewees. Member checking was carried out to enhance accuracy of reporting. The collected data was transcribed, read and re-read to ensure a valid thematical analysis. An abductive approach was utilised to combine inductive and deductive methods (Bickmore & Bickmore, 2010). All ethical protocols were observed.

IV. FINDINGS AND DISCUSSION

Focus Group Discussions: Some of the educator views on how they manage Mathematics classrooms. FGA3: Most learners at my school are ill-disciplined so I have to be harsh at times, Teaching can appear stressful as a result of learner behaviour over and above the bureaucratic paperwork that educators are expected to do. Hence disciplinary issues can make a well-planned lesson a complete nightmare thus impacting negatively on the leadership style to be employed. (Juta, 2019). FGC1: It is not easy to manage classes as some of our learners do not understand English which is meant to be the medium of instruction. I sometimes talk the greater part of the period explaining in the language which they understand in order to have work done. The above statement indicates that some educators switch from the English language to the vernacular in their desperate attempts to explain difficult or abstract mathematical concepts to the learners. This is good practice (Stein & Kaufman, 2010) as it not only helps to clarify a concept but also to develop the use of correct mathematical language (e.g. use of 'equivalent', 'congruent', 'similar', appropriately). However, care should be taken to avoid teaching most of the Mathematics lessons in the vernacular as it may disadvantage some learners. FGD3. When I teach, I avoid giving my learners time to do group work because it is not easy to manage them. Some end up playing on cell phones while others do the work. Most of the time we discuss examples like solving some Mathematical equations.

That way, I ask then learners respond and I keep guiding them till we get a solution to the problem. This indicates that it is important to be communicating with learners and correcting errors immediately. Learner involvement is therefore vital when managing classes. The above statement clearly indicate that the educator is not utilising permissive leadership style. Also. in response to interview question (d) it turned out that very few educators in the sample utilised small group as a teaching strategy in their Mathematics lessons. The constructivists encourage the use of this approach because of its merits (Carr, 2006; Susuwele-Banda, 2005). The few who employed this strategy lost out on a number of opportunities. Ideally, the learners should be encouraged to solve problems in their own ways, as recommended by Sanchez-Famoso et al. (2014), provided they arrive at the same correct answer and they can explain or justify their method. Instead, these educators taught by rules and regulations. Some of the educators reported there was often no time for group report backs to the rest of the class. The educators are therefore encouraged to ensure time for report backs and also to correct the group answers and rectify learner misconceptions. This also points to the importance of time management in Mathematics classrooms. Ngoepe and Nyaumwe (2012) observed that constructivist learning as in group work allows educators to probe learners on knowledge gaps or insights that may scaffold their missing links to new knowledge. FGC5: As for me, at times managing classes is frustrating. Some learners can be rude, at times work is not done as instructed and some learners can be just disruptive from nowhere. It is vital to note that if

time is wasted on disciplinary issues, an educator can end up rushing or employing an inappropriate leadership style which can lead to work overload for the learners (Aragon, Johnson & Shaik 2002). Furthermore, democratic leadership style enables an educator to take great care whilst involving highly motivated learners. (Nanjundeswaraswamy & Swamy, 2014). FGA3: The absence of ICT usage in mathematics classrooms is a challenge for us at times when managing classes. I may want to use an overhead projector for learners to see and understand better but we don't have resources and classes are overcrowded and pose a huge problem to manage. It is vital to note that the above point sighted is not relevant these days of Covid-19 pandemic since classes are smaller in compliance to the recommended social distancing. However as pointed out by some Mathematics educators, unavailability of resources including ICT in their schools, the lack of proper education and training in its usage, and the high cost of data where the educator is expected to use own data bundles pose as challenges when implementing any leadership style for effective class management. Furthermore, the advent of the Covid-19 era calls for greater utilisation of existing information technology and for new ways of using existing technologies, for example online teaching and learning platforms such as interactive smart boards, webinar platforms like Microsoft teams, Google classrooms, Zoom, etc. In this regard, autocratic leadership style will be mostly employed as the educator is mostly in control. This will especially benefit those learners who are unable to physically attend Mathematics lessons at school. FGB1: Good and smart classes are not difficult to manage as I can give an instruction then learners respond positively and work is done, but I have some classes where I have to try everything in order to have work done. At times when I ask a question, I will end up answering the same question myself. When I explain the new work, learners are just listening then in the same lesson I can bring out a question for discussion hence the different approaches to manage my classes. It is vital to note that leadership style can affect goals, commitment, and work satisfaction. Also, from this teacher's comments it is possible to apply both autocratic and democratic leadership styles in teaching the same Mathematics content to different classes whose participation level is different.

Some of the responses from HOD interviews on leadership styles utilised in the classrooms HC: When I carry out class visits, I have observed that educators dominate and talk to learners most of the time. Some of the Mathematics teachers are always complaining about bad learner behaviour. However, it should be noted that when managers are too timid subordinates tend to act with total impunity as if it is a right. The same can be said when educators are firm. The firmness may increase anxiety and lead to work being done without expected understanding. An educator must be flexible and accommodative to reduce anxiety in Mathematics whilst increasing room for learners to ask questions for clarity whenever necessary. Autocratic leadership style seems to be employed in cases where educators do not give learners much room to participate orally in the Mathematics lessons. HA: I am an HOD and I teach as well. During the provision of instruction, I tend to vary my approach depending on the learner responses. I can be friendly and at times very tough. Juta (2019) supported Biza, Nardi & Joel (2015) who highlight that educators tend to struggle as they attempt to balance mathematical challenges, sensitivity to students and management of learning. This calls for the educator to be more accommodative to all learner needs. It is therefore important to understand all the leadership styles as they can be helpful when employed appropriately.

HD: What I have noted from my teachers is that, some of them are calm teachers and accommodate learners a lot but struggle with managing difficult learners while the tough ones have less challenges in discipline and maintain their classes fairly well thereby get their work done that way. So, I think the leadership style depends on teacher characteristics. Effective classroom management requires educators to accommodate and pace the lessons in such a way that both the fast and slow learners are taken on board. No learner should be left behind or made to feel so. The democratic and transformational Mathematics educator anticipates and plans for both types of learner. As Woolfolk (2010) cautioned earlier, good relationships are important for positive academic and behavioural outcomes. Furthermore, the educator is expected to value and respect individual differences (Juta, 2019). HA: At times, I do not even understand a teacher's way of teaching if a teacher jumps from one concept to another before learners have understood the concept. Sometimes teachers ignore learners who put up their hands to ask questions and move on. I have such challenges as an HOD. There is a possibility that the educators referred to here are handicapped in Mathematics content knowledge (Sahin, 2015; Ngoepe & Nyaumwe, 2012). Such educators therefore lack confidence in teaching all Mathematics concepts. Less confident educators tend to either avoid or superficially cover certain Mathematics topics. Ignoring learners' questions could be a defensive mechanism because they do not want to be exposed. Alternatively, the leadership style of the educator referred to could be autocratic so it may not be effective. Questions from learners should never be ignored. HC: I have observed some teachers not being punctual for lessons especially soon after break or being absent on a regular basis. This then makes them rush to cover the scheduled work. The above notion implies that improper leadership styles are employed resulting from poor time management and thus poor classroom management as

learners will miss out on learning opportunities. This speaks to matters of poor time management and lax monitoring by the SMT. It is the SMT's duty to check that educators arrive for their lessons on time and are teaching. If the time on task is compromised it negatively impacts on the effectiveness of Mathematics classroom management: learners may become noisy and disruptive (Sanders & Rivers, 1996). Less work will eventually be covered. The lost time can cumulatively translate to many hours of Mathematics teaching and learning unnecessarily lost. (Fisher, 2009). Responses from the educators and HODs both agree to the fact that effective classroom management can be enhanced through the employment of a variety of leadership styles as necessitated by the nature of task, learner behaviour, time availability, educator characteristics and the goal to be achieved (Susuwele-Banda, 2005; Kruger & Van Schalkwyk, 2016; Woolfolk, 2010; Fullan et al, 2006; Etuk et al., 2013; Grapragasem et al, 2016).

V. CONCLUSION AND RECOMMENDATIONS

The research results indicated that some Mathematics educators in the province employed the leadership styles situationally such as autocratic leadership style, mostly when introducing a new concept, demonstrating solving of problems such as in Geometry, permissive during group work related tasks and democratic when discussing problem solving tasks. Various explanations were brought out in relation to the choice of the leadership style. These included: difference in learner ability, background, time availability, learner attitude, nature of discipline, educator characteristics, professional skills, the nature of task in question and lack of appropriate teaching resources. Learners are motivated by educators applying sound assessment techniques and by showing understanding of their views (Arin, Tuncer & Demir 2016). It can therefore be concluded that leadership styles are situational and also largely culturally orientated, embracing traditional beliefs, norms, values and preoccupation. It is also clear therefore that the effective execution of leadership styles should assist greatly in ensuring success of educative and teaching activities in the Mathematics classroom (Ersozlu & Cayci, 2016).

The discussion above points to the need for regular and ongoing professional development programmes for Mathematics educators. Such programmes will focus on upgrading Mathematics content knowledge. Confident educators are more creative and constructive in their Mathematics lessons. These programmes also help to clear Mathematics educators' misconceptions, to deal with any new curriculum initiatives, and to reduce teacher isolation (Ogbonnaya, 2011). Attendance and participation in workshops and conferences should be encouraged. Mathematics educators are expected to be well-equipped with vital professional skills in consideration of learner needs (Akın, Yıldırım, & Goodwin, 2016). In this regard, school management should facilitate by enrolling Mathematics educators on forthcoming courses. Mathematics educators can also be encouraged to upgrade their qualifications as a way of keeping abreast with effective mathematics teaching practices. Good Mathematics classroom management practices have important implications for achieving high learner performance. The best results can be achieved through best practices that include educator and learner motivation, and effective communication (Makore, 2015). Qualified and experienced Mathematics educators are repositories of much social capital and tacit knowledge that can give their schools a competitive advantage. Educators are also recommended to place emphasis on both the task and the learner as this will automatically dictate the leadership style to be employed in a Mathematics classroom.

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