The children/youth environment and its effects on the practice of teachers

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The research in this study concerns the design of classroom environments and the impact of these environments on the practice of teachers. It involves data gathering from primary and secondary schools. Original graphic behavioural mapping instruments were developed for the school-based data collection, and subsequent analysis is both qualitative and quantitative. The findings from the analysis of teachers' classroom behaviour have been related to the issues emerging from their interviews. These data inform questions about teachers' awareness of their surroundings; the extent to which this awareness impacts on their teaching, and the extent to which teachers feel they have control over the features of their classrooms. This research concludes by making a case for the importance of environmental awareness in the training and re-training of teachers. Environmental competence is an important constituent of the skilled teacher.

Introduction

In this study I have attempted to identify how certain features of the classroom environment affect the practice of teachers. Intuitively, we all know that the physical environment of the classroom has an impact on the behaviour of both teachers and pupils. The difficulty is to understand how this impact occurs, and how much of this impact is consciously and deliberately planned by the teacher. Is the teacher even aware of what is happening with these relationships?

Teachers frequently ask me for a recipe book for organising the "ideal" environment. But there is no ideal environment, and no recipe book. The only real recipe is to understand the setting and how it influences behaviour. Beyond that, lies the need to feel capable of responding to this understanding by having a proactive rather than a defeatist attitude towards the setting.

The full study involved much more data and analysis than could be reported in this paper. And the conclusions drawn on this paper exceed the data presented here.

The Instruments And Sample

Developing the research instruments has been a challenging and organic process. It was clear I needed to find a way to assess the use of the classroom environment by the teacher, but so much happens in a lesson that there was no obvious way to gather it all. The instruments were developed so as to collect information not only from the major source, that is, the classroom and the teacher but also from two secondary sources, that is, architects and regulators (officers from Local Education Authorities and the Department for Education and Employment in the United Kingdom). However, the main source of evidence is concentrated on classrooms and teachers. The instruments are divided in two groups: behavioural mapping and interview schedules. There are three different schedules for the behavioural mapping data and three different interview schedules (one for the teachers, one for the architects and one for the regulators). These will not be explained in detail here as this paper presents only some of the variables that were studied. I have collected a wide range of data in various forms and quantities (figure 1).

The Constructs

Clusters of activities

All the lessons observed were classified in *clusters of activities* that characterise a lesson independently of the subject or type of room. There are five identified clusters: *Introduction* (activities usually present at the beginning of each lesson which include pupils arriving and registration), *Teacher Teaching* (the focus of attention is the teacher, usually the whole class is focused on the teacher), *Pupils on task* (the focus of the activity is on pupils working either individually or in-groups), *Transition* (the focus is dispersed, there is usually a lot of movement in the class as pupils are completing tasks and sharing work with peers and teacher) and *Conclusion* (the focus is on cleaning up the tables, tidying up and packing, pupils leave the room and it is the end of the class).

SOURCE	QUANTITY	FORMAT		CONTENT
Teachers	4 Primary Schools 4 Secondary Schools	Observations	Classification hard/soft architecture	• inventory of what is in the classroom with classification of fixed, semi-fixed, semi-flexible and flexible features
	18 lessons observed in Primary Schools 22 hours of observations		Behavioural mapping	• plan of the room with location of teacher's movement throughout the lesson with the use of a grid
	32 lessons observed in Secondary Schools 26 hours of observations		Photographs	• illustrates the physical features and usages of the room and matches the drawn plans
	Case study in Brazil 2 Primary Schools 2 Secondary Schools		Timing	• notes are made every 2 minutes in average
	6 lessons observed in Primary Schools 7 hours of observations		Interactions	• who the teacher is interacting with at a specific time (class, group, pupil, other, none)
	5 lessons observed in Secondary Schools 3 hours of observations		Noise Levels	• measured in decibels (dB) with a decibel metre
	TOTAL PRIMARY 6 Primary Schools 24 lessons observed 29 hours of observations		Focus of the lesson	• introduction, teacher teaching, pupils on task, transition, conclusion
	TOTAL SECONDARY 6 Secondary Schools 37 lessons observed 29 hours of observations			
	26 interviews (around 4 hours on tape) Primary - 13 interviews Secondary - 26 interviews	Interviews		• perceived control of change of the environment • existence of interactions
Architects	16 practices were visited and interviewed (around 15 hours on tape)	Interviews		• approach to designing schools • procedures • opinions
	3 project files were examined	Project files		• where do interactions with teachers and schools occur in a
Regulators	DfEE - 7 interviews LEAs - 3 interviews Diocesan Boards - 2 interviews (around 9 hours on tape)	Interviews		• DfEE - national procedures/methodologies used for writing regulations and recommendations • LEA/Diocesan Boards - local procedures/briefing systems

GRAND TOTAL – OBSERVATIONS
12 Schools/61 lessons observed/58 hours observations

GRAND TOTAL – INTERVIEWS
54 interview/around 28 hours on tape

Figure 1. Data collected.

Cluster Columns

The clusters of activities generated *cluster columns*. A *cluster column* is a construct created by plotting the percentages of time spent in each lesson cluster during the lesson, informing how much of the lesson time was spent in each cluster (figure 2).
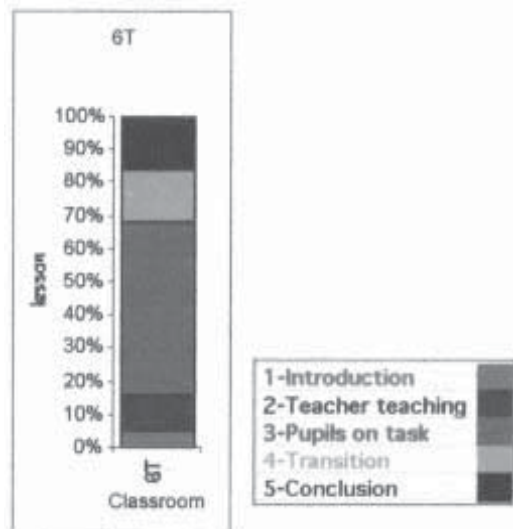

Figure2. Cluster Column

Pedagogies

The 5 lesson clusters identified that most of the duration of a lesson is spent on *teacher teaching* and *pupils on task* at varying points in the lesson. The lessons that are focused (for 50% or more of the time) on the *teacher teaching* have been labelled as having a *teacher centred* pedagogy. The ones focused (for 50% or more of the lesson time) on *pupils on task* have been labelled as having a *child centred* pedagogy. It was found that not every teacher fell in either category. Of the total number of teachers observed (sixty-one observations), 16 were neithe*r teacher centred* nor *child centred* creating a middle group in which teachers have a dominantly "balanced" pedagogy.

Flexibility Factor

In examining teachers use of the classroom space, architectural elements have been classified in terms of *hard* (fixed features) and *soft* architecture (semi-fixed, semi-flexible and flexible features). The classification is a further development of Steele's division of space (Steele, 1973). Figures for each of the features have been generated through the layout of the room. Following Steele (1973), classroom features were classified in terms of being fixed (such as walls, windows and doors) and not fixed (such as equipment and furniture). A flexibility factor was thus defined as the percentage of the room's floor area that allows change to be made by the teacher with varying degrees of effort.

Mobility Factor

The floor plan of the classrooms provided a starting point for the development of the behavioural maps. A grid layout was used (figure 3) and the teacher's movement was tracked and recorded. The observations were continuous throughout the duration of the lesson. The tracking was colour coded according to the cluster of activity (1-Introduction, 2-Teacher teaching, 3-Pupils on task, 4-Transition, and 5-Conclusion).
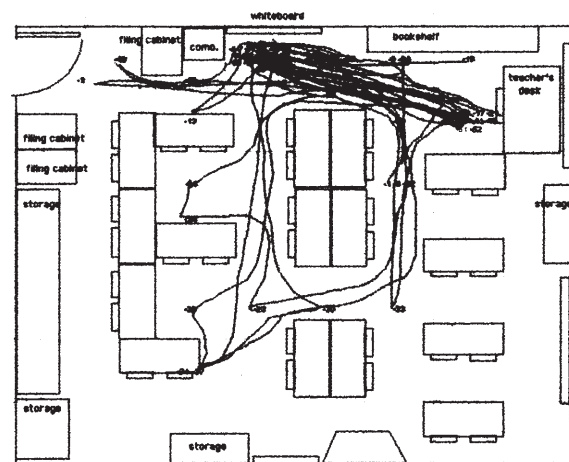

Figure 3. Classroom 4S24T – Teacher's movement tracked during a lesson.

The teacher was the focus of the observation and the combined data show the route taken by the teacher within the room. A mobility factor was thus defined as the percentage of the area covered by the teacher in the classroom. In figure 3, during the lesson observed, the teacher covered 43% of the available classroom space.

Density

The amount of space per pupil in a classroom is the *density* of the room.

Degree of Centredness

Teachers have a tendency to spend extended periods of time at specific locations in the room. Certain areas were identified as being more used than others. The *degree of centredness* then is defined as being the time spent by the teacher at specific locations as a percentage of the total lesson time. Teacher "centres"

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(where a teacher spends at least 20% of the time of the lesson) can be either single or double. If neither, they are non-centred. Figure 4 illustrates a double centred teacher.

Figure 4. Double centred teacher.

Layout Classification

Room layouts have been analysed using two factors:
(i)   in terms of the way children are seated (rows, groups, combination of rows and groups and horseshoe or circle); and
(ii)   in terms of the special resources and functions of the room required for teaching (multiple activities room - the room has *different* areas for specialist activities such as a reading corner or a wet area; single specialist room - the room has specialist facilities of a single kind such as a computer or a science lab; and general room – if tables and chairs are removed; only storage or general purpose furniture is left).

The way children sit and work is directed by the teacher's view of an effective layout. The specialist functions of the room influence the equipment, services and other features that are additional to the seating plan. These two factors generate different combinations of the structure of the layout of the room.

Each room is classified as a combination of the two factors above, for example classroom 7S38T is a multiple activities room organised in-groups (figure 5). Features of the seating arrangement are generally flexible. Features related to the resources and functions of the room are varied (semi-fixed, semi-flexible and flexible) as it becomes more specialised.
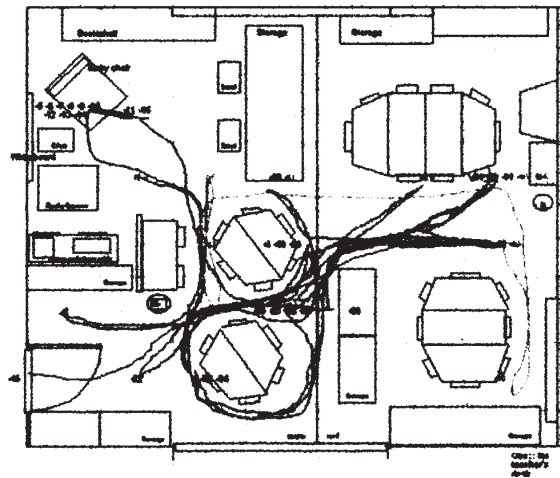
Figure 5. Classroom 7S38T is a multiple activities centres room organised in-groups.

Powerful Instrument

Now, with the constructs and definitions explained, it is possible to demonstrate (figure 6) how powerful these instruments are when looking at them together. Classroom 1S4T is clearly a teacher-centred lesson with 79% of the lesson time spent on the teacher teaching the whole class. The teacher's location remained fairly stable at the front of the class with a mobility factor of 20% and a degree of centredness of 55%. The layout is clearly in rows and it is a general space with a flexibility factor of 99%.

Figure 6. A powerful instrument.

Some Of The Findings

·   The flexibility factor encountered varied from 56% to 99% of classroom area.

·   88% of the rooms have a flexibility factor of over 80% of the total area.

Rooms have a much higher possibility of change than that which is perceived by teachers.
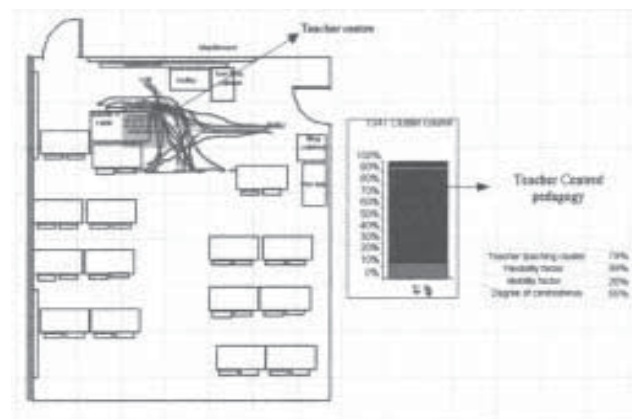
- The mobility factor encountered varied from 7% to 68% of the area of the room.
- The degree of centredness varied from 9% to 93%.

Teachers have a tendency to spend extended periods of time at specific locations of the classroom (often their tables); the teacher centres. The variation of degree of centredness is enormous. Mobility and centredness have consequences for the pedagogies employed by the teacher. These two constructs demonstrated the enormous impact of their movement patterns and location on what teachers actually do in the classroom (their chosen pedagogy).

- The least flexible rooms tend to be of a single activity nature while the most flexible rooms tend to be general spaces.
- In primary schools, as flexibility increases, so does teachers' mobility (r=0.46).
- Science laboratories in secondary schools are the least flexible rooms.
- The denser the classroom, the more mobile the teacher.

The more tightly packed the rooms, the more difficult it is for pupils to move, hence, the teacher tends to move more in order to make more contact with the pupils. The more they move, the more they can interact with individuals and groups.

- As teachers become more centred, they become less mobile (r= -0.59).
- Lessons with the highest proportions of time spent with "pupils on task" tend to take place in classrooms that are more spacious and less dense.
- The *most* teacher-centred lessons have a seating plan that is organised in a circle.
- Teacher-centred lessons tend to take place in classrooms organised in rows and be general spaces.
- Art, and Design and Technology in secondary schools were found to be typically child-centred.
- Primary teachers tend to have a more balanced approach in terms of the structure of their lessons.
- Most child centred lessons in secondary schools tend to take place in multiple activity centre rooms where seating is organised in-groups.
- Multiple activity centre rooms were found to be the least dense classrooms.

- The location of the teacher in the room (degree of centredness and mobility), does not relate to the layout of the room, but to the pedagogy.

The table on the next page features some of the data on the classroom environment variables.

The Emprisoned, The Free and The Simply Confused

The *emprisoned*:
"…there's so little room to move…

…we can't do large work very easily because there's hardly anywhere to put it…

…the floor slopes and everything roles off the tables and there isn't really enough room to have trays to keep things that role off…"(Interview 12T)

The *confused*:
- "No, do I take the classroom into account as an environment (when planning). Not at all."

  Then this same teacher contradicts herself:
- "In fact I start the year by changing the classroom lots of times until you get to know the children."

  Then once more she contradicts herself:
- "I don't find it (the room) interferes at all (with my teaching)…" (Interview 37T)

The *free*:
- "The thing I would say is that nothing is impossible within a room, you know… It is just the vision of the teacher, I think, it's important… and the forward thinking of the teacher as well." (Interview 06T)

Progressively, I have become interested in the environmental awareness that teachers display. It seems reasonable to assert that teachers would prize wisdom above ignorance. At the least, therefore, I would hope and expect that teachers would wish to be aware of the relationships that have been identified in this study between their behaviour in the classroom and the design of it. I also assume that they would like to be autonomous professionals making deliberate choices in their teaching, rather than having their hand forced, and their behaviour controlled, by the chance allocation of an *inherited* classroom. Reflecting over the data and findings (only partially and briefly presented here), it is clear that teachers that question more about their own settings have a tendency to be less satisfied with their classrooms. When a teacher does not recognise

Figure 7. Features of the classroom environment.

Lesson	Focus (Pedagogy) %					Construction Mobility factor (m/%)	Density (m/pupil)	Seating arrangements	Resources
	Introduction	Teacher teaching	Pupils on task	Transition	Conclusion				
1S1T	7	14	68	7	4	46%	41	4.6 groups	mult space
1S2T	6	3	82	0	10	21%	40	10.0 rows	single spec.
1S3T	6	3	68	15	9	41%	55	3.5 comb.	general
1S4T	14	79	0	2	5	55%	20	6.4 rows	general
1S5T	9	23	57	2	9	17%	43	2.9 comb.	general
1S6T	5	11	52	16	16	11%	48	4.9 rows	mult speci.
1S7T	2	67	24	2	4	22%	43	3.1 N/A	general
2S8T	22	12	39	20	7	44%	29	2.2 groups	mult space
2S9T	2	0	51	38	11	36%	31	2.3 groups	mult spec
2S10T	8	40	23	21	8	35%	28	2.9 circle	single spec.
2S11T	11	30	32	19	9	60%	23	2.9 groups	mult spec
3S12T	5	21	63	5	5	65%	34	7.0 groups	general
3S13T	5	0	75	5	15	60%	16	10.0 comb.	general
3S14T	4	13	74	4	4	22%	45	7.0 comb.	general
3S15T	5	36	32	9	18	91%	10	4.9 rows	general
3S16T	10	40	40	5	5	40%	27	5.4 groups	mult spec.
3S17T	7	79	0	7	7	83%	7	4.0 circle	single spec.
3S18T	27	5	64	0	5	50%	32	5.1 comb	general
3S19T	4	87	25	0	4	67%	35	8.0 comb	single spec
3S20T	3	0	88	3	6	12%	33	23.8 groups	mult spec.
3S21T	17	26	39	13	4	18%	48	4.3 groups	mult spec.
3S22T	5	0	62	24	10	93%	29	4.0 groups	general
4S23T	0	89	0	5	5	26%	17	3.6 rows	single spec
4S24T	12	38	46	2	2	54%	40	2.1 comb	general
4S25T	15	31	42	8	4	10%	33	3.2 groups	general
4S26T	10	10	63	8	8	15%	51	3.3 groups	mult spec
4S27T	13	3	65	13	6	26%	30	7.8 rows	single spec.
4S28T	5	64	18	5	9	40%	38	1.7 rows	general
4S29T	5	45	43	5	3	30%	45	2.4 groups	single spec
4S30T	12	0	86	0	2	52%	31	5.2 rows	mult spec.
5S31T	0	0	100	0	0	9%	48	7.0 groups	mult spec.
5S32T	12	0	82	6	0	16%	38	6.7 groups	mult spec
5S33T	9	0	89	0	7	26%	NA	7.0 groups	mult spec
6S34T	6	5	83	2	5	19%	57	2.1 groups	mult spec
6S35T	0	33	35	16	16	68%	80	3.0 groups	mult spec
6S36T	8	30	53	3	8	40%	48	1.8 groups	mult spec
6S37T	8	15	54	23	3	44%	46	2.8 comb	general
7S38T	31	0	44	20	4	20%	52	1.7 groups	mult spec
7S39T	7	16	33	42	2	42%	44	2.4 groups	single spec
7S40T	43	10	37	8	2	59%	37	7.0 groups	mult spec
7S41T	13	28	51	6	2	73%	41	2.8 groups	mult spec.
7S42T	6	10	62	20	2	70%	36	2.4 groups	mult spec.
7S43T	3	10	40	37	2	23%	44	1.9 groups	mult spec
7S44T	17	26	46	0	6	21%	52	2.5 groups	mult spec.
12S45T	5	3	84	5	3	30%	45	6.3 rows	general
12S46T	0	2	66	29	2	27%	39	4.6 groups	mult spec.
12S47T	5	34	53	5	9	59%	21	4.2 rows	general
12S48T	13	46	26	10	3	23%	39	10.5 rows	single spec.
12S49T	5	38	50	5	3	22%	53	2.5 rows	general
12S50T	5	25	58	10	3	57%	51	1.7 rows	general
8S51T	14	78	0	3	7	80%	25	0.7 rows	general
8S52T	0	63	35	0	3	60%	44	1.0 groups	general
8S53T	2	8	70	18	2	68%	45	3.2 rows	general
8S54T	2	38	57	0	2	79%	50	0.5 groups	general
9S56T	9	88	8	0	3	51%	25	2.3 circle	general
9S57T	0	76	21	0	3	21%	18	1.3 rows	general
10S58T	6	88	0	0	6	82%	35	0.8 rows	general
10S59T	4	83	0	8	4	48%	45	0.8 rows	general
10S60T	2	55	41	0	2	25%	64	1.4 rows	general
11S61T	2	63	0	34	2	51%	83	2.7 rows	general
11S62T	2	66	30	0	2	54%	41	1.8 rows	general

the role of the environment, it is unlikely that change will occur. On the other hand, dissatisfaction with the environment seems to be a first step towards change. The positive recognition that the environment could be better planned is a first step to the empowerment of the teacher. The data suggests that some teachers question and tend to recognise problems with their setting, but that they may stop once that recognition is made, not taking any further step towards being more proactive in changing the space. This attitude might be described as awareness without competence.

There seems to be a need for teachers to learn how to question their settings in a constructive way, looking for solutions and being proactive in feeling in control of change over the changeable features. Taking a proactive attitude would permit the teacher to experiment, and with experimenting find out what works and what does not work, since each teacher and each group of students will be different. The classroom cannot be allowed to exist as a static feature. It needs to be questioned, challenged and transformed. According to Trancik, the ability to control the environment leads

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to feelings of accomplishment and independence whereas a lack of control may result in helplessness (Trancik and Evans, 1995). When teachers realise that they have control, they can feel empowered by this same environment that once would have defeated them.

Awareness can make a person sensitive to subtle aspects of the environment and bring to light the adverse effects of a *bad* environment. In a sense, the goal in developing environmental awareness is to reach a new understanding of how the environment relates to human activity.

But awareness, by itself is not enough. A teacher might be able to identify problems occurring in a setting but be unable to use this knowledge to carry on a meaningful dialogue with the environment to transform it to fit their requirements. Awareness is the first step, but may not prompt any movement away from passivity. It may not be enough to provoke teachers to take action and rearrange a setting. I agree with David who stated that "the development of environmental literacy involves the transformation of awareness into a critical, probing, problem-seeking attitude toward one's surroundings." (David, 1975: p. 166) Developing awareness helps to overcome passivity since active choices can be made and within these choices, experimentation with a variety of spatial alternatives enables the teacher to challenge the environment.

There seems, therefore, to be two jobs to be done. First, developing environmental awareness involves *understanding* the effects that the classroom environment has on the teacher. Second, being *environmentally capable* of responding to the knowledge requires that teachers act as designers of their environments, taking deliberate control of the settings.

I would hope that teachers in their classrooms will redesign them no matter what the designers or architects want or expect. Every teacher becomes a designer, responsible for preparing the environment to achieve his or her educational objectives.

Professional Responsibility

If the environment is to be predetermined by an architect, than it is clearly desirable for it to be done in close collaboration and discussion with the teacher, but teachers need to know what their role is in the process. If the environment is *not* predetermined and full flexibility is expected, teachers need to be aware of this, and of the professional responsibility that is then placed upon them to develop their environment.

It then becomes a professional duty for teachers to make use of the flexibility in their own ways. If teachers are given a flexible space, the responsibility of customising it lies with the schools and the teachers. And they need to know what they are doing. However, as Gifford points out, such environmental competence can only be achieved once people have an ability to deal with their immediate surroundings in an effective and stimulating manner (Gifford, 1987).

Because of the hierarchical nature of the process by which classrooms are designed, and the fact that teachers inherit classrooms, there is a tendency to create a passive acceptance by teachers of the space they are given. It is necessary to find ways to give teachers greater authority in designing and redesigning the spaces in which they teach. The implications of this should be recognised directly in teacher training and in teacher's professional development in terms of environmental awareness. Such awareness would enable the teacher to analyse the learning spaces more critically and become autonomous in their control over the setting.

The classroom environment influences behaviours in many different ways. Environmental messages stimulate movement, call attention to some things, but not others, encourage involvement, invite children to hurry or move calmly. The environment sends messages and both teacher and pupils will respond. The influence of the environment is continuous, and how well it communicates with the users will depend on how well the environment is planned.

Architectural facilities are designed in terms of a generalised prediction of behaviours, activities, functions, and teaching styles. But a variety of teachers with specific and very different groups of pupils will subsequently inhabit and inherit these spaces. Each teacher is different and each group of pupils is different and teachers must develop the generalised environment for specific purposes and groups. When a new building is complete and the architect hands it over to the teacher, adaptations will occur. When looking at this study it seems reasonable to suggest that the arranged environment can be used as a deliberate part of the teaching strategy, complementing and reinforcing other strategies the teacher uses to support children's learning.

Every teacher and every child in every lesson is in some kind of classroom. It is an inevitable part of the educational scene. I believe that a professional teacher should know how to use it effectively.

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