Using Technology to Monitor Workload in Dance Training

By Kim Hutt, Head of Physical Support, London Contemporary Dance School

Dance science is a growing practice within an art steeped in tradition, and scientific concepts are now becoming more widely accepted by dancers and dance educators.

Principles of periodisation have been introduced in to dance curricula since 2000 and are now being more commonly used within dance institutions and companies.

"The concept of periodisation aims to help optimise dancers' preparation for performance. It involves breaking down the days, weeks and months before performances into periods of time where different priorities are given to different types of physical and mental training depending on the total length of time available, the type of preparation needed and the proximity of the performance."[1]

Due to the multifaceted nature of dance, periodisation, by definition, is virtually impossible to include into a full-time dance degree, however London Contemporary Dance School has been monitoring the physical intensities of technique classes across its students' programme with some promising results.

Monitoring training load is the first step to periodising training. Training load is calculated by using one of two equations:

EQUATIONS FOR CALCULATING TRAINING LOAD

Equation 01
Training Volume (duration of training) X Training Intensity =Training Load

Equation 02
Session rate of perceived exertion (RPE) X Duration (minutes) = Training Load

Once training load is captured, it is possible to manipulate that load to allow for training phases and sessions focused on specific goals.

London Contemporary Dance School's system of load monitoring has introduced intensities that are aligned with exercise prescription to stimulate the aerobic and anaerobic systems, based on the following guidelines:

AEROBIC AND ANAEROBIC INTENSITIES

Aerobic
70-90% HR Max (heart rate maximum) 4-17 RPE (Rate of Perceived Exertion) 20-40 Minutes

Anaerobic 1:1
90-95% HR Max (heart rate maximum) 6-17 RPE (Rate of Perceived Exertion) 3-6 Minutes

The dancer's day is structured so that higher intensity classes sit alongside lighter intensity classes, or recovery classes to avoid overtraining and burnout.

Table 1 provides an example of the heart rate zones found in a single contemporary dance class at London Contemporary Dance School. Rarely do dance classes provide such cardiorespiratory stimulus. Usually dance classes are less intense for the cardiovascular system, and thus heart rates would be lower for longer periods in the class.

Table 1
Time spent in heart rate zones taken from a heart rate monitor during a 1-hour contemporary class.

Heart rate zone (beats per minute)	Time spent in zone (minutes:seconds)
180-200	7:19
160-180	22:50
140-160	15:14
120-140	09:10
100-120	07:18

"It is widely recognised that the traditional dance class does not provide sufficient physiological stimulus to support the cardiorespiratory demands of many dance choreographies,4 and for some time, dance students have been encouraged to undertake supplementary fitness training."

SPECIAL FOCUS ON SAFETY

Dance teachers at London Contemporary Dance School have embraced the innovation and have reported enjoying the challenge of reconsidering the delivery of the classes. Students have subjectively reported enjoying the feeling of being physically pushed, with the comfort of knowing that there will be recovery classes. Objectively, there has been a 20% reduction in injuries, when compared to the same time period the previous year.

During an era of evolving technological advances, data is being collected more efficiently within sport and dance. Some larger dance schools and companies benefit from software packages. The dancer's day is structured so that higher intensity classes sit alongside lighter intensity classes, or recovery classes to avoid overtraining and burnout.

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system, and thus heart rates would be lower for longer periods in the class allow for extensive and highly sophisticated data analyses. However, many of these packages are expensive and smaller schools and companies do not have the financial or technological resources to justify the cost. The Physical Support Team at London Contemporary Dance School capture injury, fitness, a psychology data using Microsoft Forms, which automatically populates some impressive live Excel spreadsheets.

To monitor injuries, simply inputting a date range within their injury spreadsheet will automatically generate updated numerical data and graphs that allow the team to observe injury trends across a week / term / year. The simplest click of a button will allow the team to identify whether students are suffering from injuries to a specific body part when working on particular choreography, in a particular class or at certain times in the term or year. This allows the team to respond to any observable trend with advice and recommendations for enhanced safe practice.

In order to identify the effectiveness of the physical load of the programme, all undergraduate students undergo fitness testing spread across three time points each year. Fitness data are also collected via Microsoft Forms, and the results generate information that can be used for the benefit of both the students and the Physical Support Team. Simply inputting a student name into the automatically generated live spreadsheet will reveal not only the student's fitness scores for their most recent test, but will also provide their improvement (or decline) as a percentage from their previous tests and the previous year.

All students are also given an 'overall fitness score', which along with all individual tests are placed into quartiles to provide an indication of their fitness levels compared to other students and in relation to the maximal score. Using a simple mail merge, students receive their results following each test day, along with an advice sheet explaining the implications of their results.

Table 2
An example of fitness testing data for one academic year (details of tests removed)

Term 1	Term 2	Term 3	Term 1 -2 Raw Diff	Term 2 -3 Raw Diff	Total Year Raw Diff	Term 1 Max %	Term 2 Max %	Term 3 Max %	Term 1-2 Diff %	Term 2-3 Diff %	Total Year Diff %	Term 1 Quartile	Term 2 Quartile	Term 3 Quartile	Term 1 Rank	Term 2 Rank	Term 3 Rank
85	85	85	0	0	0	100%	100%	100%	0%	0%	0%	75-100%	75-100%	75-100%	1/122	1/108	1/75
50	58	60	8	2	10	83%	97%	100%	16%	3%	20%	75-100%	75-100%	75-100%	3/121	4/107	1/73
62	95	120	33	25	58	21%	32%	40%	53%	26%	94%	0-25%	25-50%	25-50%	93/121	76/109	55/75
57	75	100	18	25	43	19%	25%	33%	32%	33%	75%	0-25%	0-25%	25-50%	103/121	94/108	70/75
84	85	100	1	15	16	84%	85%	100%	1%	18%	19%	75-100%	75-100%	75-100%	9/121	8/108	1/73
89	89	97	0	8	8	89%	89%	97%	0%	9%	9%	75-100%	75-100%	75-100%	5/121	9/106	4/73
126	100	95	-26	-5	-31	42%	33%	32%	-21%	-5%	-25%	25-50%	25-50%	25-50%	40/121	75/107	52/69
120	150	180	30	30	60	40%	50%	60%	25%	20%	50%	25-50%	25-50%	50-75%	50/120	38/103	33/75
102	—	150	—	—	48	20%	—	30%	—	—	47%	0-25%	—	25-50%	68/111	—	27/80
Term 1	**Term 2**	**Term 3**	**Term 1 - 2 Raw Diff**	**Term 2 -3 Raw Diff**	**Total Year Raw Diff**	—	—	—	**Term 1-2 Diff %**	**Term 2-3 Diff %**	**Total Year Diff %**	**Term 1 Quartile**	**Term 2 Quartile**	**Term 3 Quartile**	**Term 1 Rank**	**Term 2 Rank**	**Term 3 Rank**
55	**64**	**66**	**8**	**2**	**10**	—	—	—	**15%**	**3%**	**19%**	**50-75%**	**50-75%**	**50-75%**	**26/122**	**12/109**	**21/75**

These data analyses allow the team to observe correlations between specific fitness components and injury for each student and as groups. For example, the team would look for correlations between lateral pelvic control and lower limb injury or between press ups and upper body injury.

There are limitless possibilities for data collection and analysis using these methods. London Contemporary Dance School is demonstrating that while sophisticated Excel (or other IT) skills and time resources are required to develop these systems, there are many opportunities for effective and efficient injury and fitness data collection without the need for specialised software.

FURTHER INFORMATION

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For more information on supplemental training, check out One Dance UK's Supplementary Training for Young Dancers by Edel Quin: www.onedanceuk.org/supplementary-training-for-young-dancers

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