

THE FLEMISH INTERACTIVE COACHING MONITORING SYSTEM (FICOMS)

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Abstract

As large-scale coach education programmes receive a growing amount of attention and investment (e.g., human and financial resource), the case for increased understanding of their impact is a pressing matter. In this paper, we outline the creation of the Flemish Interactive Coaching Monitoring System (FICOMS) within the Flemish School for Coach Education (Belgium). FICOMS is a data warehouse consisting of multiple databases, which was set up in 2019 to integrate data on coach education and coach certifications (1960-present), active coaches within club-organised sports (2014-present) and sport clubs, sports participants and sports infrastructure. FICOMS provides a variety of interactive and externally facing dashboards with useful statistics on coach education and coaching in Flanders. For example, the evolution of drop out ratios of qualified versus non-qualified coaches in sports clubs and sports federations can be identified, as well as the evolution of the percentage of qualified coaches in a specific sport, sports federation, gender or regional differences. By describing the main characteristics of FICOMS and sharing some emerging insight and early possibilities, we aim to clarify the potential of this information technology for different stakeholders, such as governments, policymakers, sports federations, Olympic committees, education partners, municipalities and researchers.

Keywords: benchmarking, coach education, evaluation, monitoring, sports coaching, sports policy

34 **The Flemish Interactive Coaching Monitoring System (FICOMS)**

35 Coaches are central to both promoting sport within society and contributing to the
36 development of healthy and active populations (Erickson, Bruner, MacDonald & Côté, 2008).
37 Not only are coaches concerned with improving the athletic performance of individuals and
38 teams (Cushion, Armour and Jones, 2003), but also enhancing the personal well-being of
39 those who take part in sport (European Commission, 2020). As such, the role of the coach
40 should not be understated. Not simply because of the vast scope of their role, but also because
41 of the significant scale of the ‘coaching workforce’. According to the International Council
42 for Coaching Excellence (2013), sports coaching occurs in nearly 200 countries, is delivered
43 by millions of coaches and received by an even greater number of participants. At a more
44 local level, according to a report by Lara-Bercial et al. (2017), it is suggested that in the
45 European Union (EU) alone, up to 9 million coaches are delivering sport to more than one
46 hundred million participants across all twenty-eight member states. To offer a comparison, the
47 EU is home to close to 6 million teachers, 1.6 million doctors and 1.6 million police officers
48 (Eurostat, 2019). Consequently, it can be argued that sports coaches are one of Europe’s
49 largest workforces (European Commission, 2020).

50 Indeed, we support the argument made by others that while global interest in sports
51 coaching has never been higher, high-quality sports coaching is a shared international concern
52 (Callary & Gearity, 2019; International Council for Coaching Excellence, 2013). In direct
53 response to this concern, there has been an increase in the development of large-scale coach
54 education programmes worldwide, which seek to improve the quality of sports coaching
55 (Duffy et al, 2011). Although much of this early pioneering work was undertaken in Canada,
56 Australia and the UK during the 1990s, countries continue to develop their coach education
57 programmes and frameworks around the globe (Duffy et al, 2011; Campbell & Waller, 2020).
58 For example, in South Africa “more emphasis is being placed on the quality of coaching

59 through a proposed standardised series of qualifications” (Coopoo & Morris-Eyton, 2014, p.
60 3). Going further, coach education in South Africa “is being foregrounded by the
61 implementation of the South African Coaching Framework” (Morris-Eyton & Roux, 2019, p.
62 87). Meanwhile in Brazil, where sports coaching is a recognised professional activity
63 (Ciampolini et al, 2020, Milistetd et al, 2016), the majority of coaches are required to be
64 educated to degree level in a relevant subject (e.g., physical education) by law (Galatti et al,
65 2016). Finally, much more insight can be found within the International Sports Coaching
66 Journal ‘Coaching in...’ section; a burgeoning body of work which reflects the breadth and
67 depth of sports coaching activity around the globe. We have provided a brief summary of this
68 work in Table 1, which can be found below.

69 However, despite what appears to be a colossal amount of resource (i.e., financial and
70 human) invested into the design and development of coach education frameworks, little
71 attention has been paid to meaningful long-term monitoring and evaluation within this field.
72 By that, we mean evidence of a coherent and comprehensive monitoring and evaluation
73 system which accounts for input (i.e., coaches entering programmes), throughput (i.e.,
74 characteristics of those programmes) and output (i.e., sports coaching activity, coach drop
75 out) over time. Instead, coach education researchers have spent much time investigating
76 single programme-level issues including how coaches learn (Mallett, Trudel, Lyle & Rynne,
77 2009; Stodter & Cushion, 2017) and how coaches experience coach education (Piggott, 2012).
78 While this is undoubtedly beneficial (for example, this research has been translated into
79 guidelines to make improvements to specific programmes), we argue that the paucity of
80 research concerned with the monitoring and evaluation of coach education frameworks is an
81 issue. Yet, to our knowledge only a limited amount of this type of work has been undertaken
82 (e.g., Estonian Foundation of Sports Education and Information, 2020; sports coach UK,
83 2009). While policymakers and researchers mostly have a clear view on the quantities and

84 characteristics of coaches entering coach education programmes (i.e., input), successfully
85 completing these programmes and obtaining qualifications (i.e., throughput), few up-to-date
86 monitoring and evaluation systems are available to understand (for example) who is actively
87 coaching within the field and where (i.e., output). Methods used are most commonly surveys,
88 providing only a limited response to such questions at one specific snapshot in time (Santos et
89 al, 2019).

90 While we have made the case for the significance of sports coaching, the growth in
91 education programmes to support coaches and the considerable resource implications of this
92 work, central to our argument is that insights generated from monitoring and evaluation work
93 has great utility for a wide variety of sports coaching stakeholders. For example, where
94 organisations operate at an international level there is an opportunity for benchmarking (see:
95 North, 2016). For regional or local organisations, the data presents an opportunity to
96 understand which coaches are required where and what type of support should be provided for
97 whom. This type of work is not new and exists or is well developed within other sectors. One
98 closely related sector is sports participation, where monitoring and evaluation is
99 commonplace, carried out in sophisticated ways for a variety of purposes (e.g., Cushman,
100 Veal & Zuzanek, 2005; Gratton, Rowe & Veal, 2011). In the UK “NGBs ‘earn autonomy’
101 (and increased public funding) through the creation of ‘Whole Sport Plans’ which are subject
102 to biannual review and ongoing monitoring and evaluation” (Piggott, 2012, p. 537).
103 Monitoring and evaluation is also the norm within international sport for development
104 settings, specifically as a means of developing evidence of ‘what works’ in “a field defined by
105 its claims as opposed to its results” (Harris, 2018, p. 796). It would seem that parallels could
106 be drawn here with the field of coach education. As such, within the present paper we wish to
107 not only advance calls for the type of work to be carried out, but also showcase The Flemish
108 Interactive Coaching Monitoring System (FICOMS). In doing this, we will demonstrate how

109 the long-term monitoring and evaluation of coach education and its impact in the field of
110 sports coaching in Flanders is both unique, has utility and can have wide-ranging impact
111 among a variety of sports coaching stakeholders (e.g., policymakers, sports federations and
112 local municipalities).

113 **Characteristics of FICOMS**

114 FICOMS has been active since October 2019 and connects different sources of historic
115 information, including pre-existing standalone databases, together into a single data
116 warehouse. The main databases and the most important connections between them are
117 illustrated in figure 1. The relationship between the different databases makes it possible to
118 monitor which coaches are active within club-organised sports in Flanders on a yearly basis
119 (data from 2014-2019) including the sports clubs or sports infrastructures with active coaches.
120 FICOMS also makes it possible to establish relationships between characteristics of coaches
121 and sports participation (data from 2014-2019). Since the Flemish School for Coach
122 Education (VTS) is responsible for coach education in Flanders (Vangrunderbeek & Ponnet,
123 2020), FICOMS gives full insight in relation to coaches obtaining new qualifications (data
124 from 1960-present) and the content of coach education programmes (data from 2010-present).
125 Within the present section, we intend to describe how the complex background structure of
126 FICOMS has been set up by linking four different databases in a data warehouse and then
127 adding three layers to it to make it possible for creating user-friendly dashboards.

128 Firstly, the database *SportsDB* contains more than 28,000 sports clubs and sports
129 federations in Flanders ([https://www.sport.vlaanderen/waar-sporten/vind-een-
130 sportorganisatie/](https://www.sport.vlaanderen/waar-sporten/vind-een-sportorganisatie/)). This is always up to date, in real time, and contains a unique ID for each
131 and every sports club, name, abbreviation, legal form, date of incorporation, contact details,
132 address(es), phone, e-mail, website, social media, sports infrastructures that are used, sports
133 and disciplines, links/relations with other organisations (e.g., sports federations on Flemish,

134 Belgian, European or international level or sports services in the municipalities), target
135 groups, creation and modification dates, and much more.

136 Secondly, the database *Spakki*, contains data related to more than 22,500 sports
137 infrastructures (<https://www.sport.vlaanderen/waar-sporten/vind-je-sportplaats/>). The
138 database is always up to date, in real time, and similarly contains a unique ID for every sports
139 infrastructure, name, type of sports infrastructure, owner, website, address, location in a sports
140 domain (group of sports infrastructures), usage (schools, groups, individuals), surface, width
141 and height (or number of lanes, perimeter, etc.), sports clubs that use the sports infrastructure,
142 specific features (e.g., toilet, shower, parking, lighting), creation and modification dates, etc.

143 Links between sports clubs, sports federations, sports and sports infrastructures can be
144 drawn by linking both databases listed above. Next, linking coaches with sports clubs, sports
145 federations, sports or sports infrastructures, a third database (*CoachDB*, not publicly
146 available) was set up in 2013. For sports federations it became mandatory that same year (by a
147 decree on the recognition and subsidisation of sports federations) to give a complete digital
148 overview of all their active coaches on a yearly basis. The data on the coaches contains
149 personal details (name, surname, address, birth date, gender) for checks in the subsidisation
150 process, but was anonymised after processing and before uploading in the database where
151 every person is allocated a unique but encrypted ID. Besides the remaining data on gender,
152 age and residence, every coach (by its ID) is linked to one or more sports clubs, one or more
153 sports federations, one or more sports and possesses either no qualification, a Physical
154 Education (PE) qualification, a qualification from VTS or a combination of both.

155 At this point, a fourth database, ‘Vlaams Opleidingen voor Trainers Administratie
156 Systeem’ (*VOTAS*) (<https://www.sport.vlaanderen/vts>), plays an essential role. *VOTAS* is the
157 database of the Flemish government, managed by VTS, which contains every coach
158 qualification obtained since 1956 and every PE-qualification since 2008. Although not

159 systematic, also many PE qualifications before 2008 are registered in the database. In the
160 work of Vangrunderbeek & Ponnet (2020), different pathways for obtaining a qualification
161 are described, such as pathways for former elite athletes. Indeed, *VOTAS* contains a lot more
162 information than simply qualifications. Every coach education programme (with details on
163 modules, items, hours) and coaching course in Flanders is registered in the database, every
164 coach has to enrol for the course, grades are given by our coach developers through the
165 system, etc. Each sports federation has to list a unique *VOTAS*-ID for every qualified coach
166 and during the subsidisation process this information is checked and altered if necessary,
167 before uploading this information to the *CoachDB*. By combining *VOTAS* and *CoachDB*, it is
168 possible to know which coaches are qualified in what sport or sports federation, the
169 percentage of qualified coaches in each sport, which gender, age or regional differences exist,
170 etc.

171 The complex structure in the background of FICOMS is described in the above
172 paragraphs. The real strength of FICOMS, we argue, is how complex information is translated
173 into easily understandable, interactive dashboards (foreground) with useful insights and
174 statistics on coaching in Flanders. As such, we have created a system (figure 2) with three
175 layers (data store, data model, data visualisation tool). The data store is developed to store the
176 data and perform calculations on the data. The data model is created for making relations
177 between dimensions and facts (calculations from data store). The data store and data model
178 refreshes automatically each day, so every calculation (and visualisation) on the data is
179 automatically updated. For data visualisation, Microsoft Power BI Pro and Embedded
180 functionality is used, because of the integration with other existing systems, possibilities
181 (bookmarks, export of data), visuals, design and ease of use. Our data and visualisations are
182 presented in layers to the many different users. The first layer is non-secure and shows
183 publicly available information to interested citizens, policymakers and researchers who want a

184 general overview. The second level is a secure, non-public layer which is accessible for
185 policymakers at municipality level or sports federation level, but is also a layer for in-depth
186 policy (e.g., Sport Vlaanderen, Minister for Sport, parliament). Data are anonymised for all
187 layers to be compliant with the General Data Protection Regulations (GDPR). It is worth
188 noting that all dashboards are interactive. For example, when one page on the dashboard
189 represents the number of active coaches on a yearly basis between 2014 and 2019, data filters
190 are added to that page so that a user can filter on gender, age category, qualified vs. non-
191 qualified, region, sport, sports federation, and each combination. This means that with one
192 page on a dashboard, a user can have dozens of graphs with very specific and tailored
193 information.

194 FICOMS has been developed to monitor input, throughput and output of coaching in
195 Flanders (figure 3) so that policymakers can intervene quickly when performance indicators
196 change. With regard to input, there is permanent monitoring of the background (i.e., age,
197 gender, residence, sport, sports club, sports federation, PE-background) of coaches starting a
198 coach education programme and the different pathways that coaches follow in their coach
199 education (Vangrunderbeek & Ponnet, 2020). FICOMS is installed to also monitor the
200 throughput, meaning the characteristics of coach education programmes (i.e., modules, items,
201 hours, success ratios) and coach developers (i.e., age, gender, residence, courses, theory vs.
202 practice hours), monitoring differences between sports and benchmarking the coach education
203 programmes with other countries. A Holistic Quality Control (HQC) is set up to follow up on
204 quality of courses, coach developers and exams. An important performance indicator for sport
205 policy in Flanders is how many coaches obtain a new qualification every year, with trends
206 over time, pathways or differences in gender, age, sports and regions. However, the most
207 difficult part is monitoring the output. This includes the characteristics of active coaches
208 within Flanders' sports clubs. For example: how many (qualified and non-qualified) coaches

209 are there active and which trends are concerning? How many sports clubs do/don't have a
210 qualified coach and are there differences between sports, sports federations, regions, gender,
211 age, etc? How many new coaches start (new) or stop (drop-out) coaching every year? An
212 example of a dashboard in English illustrating the possibilities of FICOMS can be found here:
213 [https://www.sport.vlaanderen/kennisplatform/thema-trainers/db-coaches-active-in-flanders-](https://www.sport.vlaanderen/kennisplatform/thema-trainers/db-coaches-active-in-flanders-belgium/)
214 [belgium/](https://www.sport.vlaanderen/kennisplatform/thema-trainers/db-coaches-active-in-flanders-belgium/).

215 Before describing the setting up of an interactive coaching monitoring system in
216 Flanders, we illustrated in the previous section that FICOMS – through its unique relationship
217 between four complementary databases – is able to give insights in relation to more than just
218 singular coach education programmes. We also highlighted the long-term monitoring and
219 evaluation possibilities and its impact for the stakeholders (e.g. policymakers, sports
220 federations and local municipalities) in the field of sports coaching in Flanders.

221 **How was FICOMS made possible?**

222 Coach education in Flanders has a long tradition (Vangrunderbeek & Ponnet, 2020).
223 However, until 2019, it was only possible to monitor the input and throughput (figure 3) of
224 VTS and as such, understanding of coach education in Flanders was limited. Now, because of
225 FICOMS, it is possible to arrive at detailed insights on the characteristics of our coach
226 education programmes since 2010, the number of coaching courses since 1998, number of
227 coaches following a course and obtaining a qualification since 1960, etc. Details about
228 coaches following our courses, like their PE-background, previous qualifications, study
229 results, geographical information, etc. only became visible progressively since 2010.
230 Structured data collection on active coaches in the sports clubs in Flanders started only in
231 recent years. Before explaining the legal framework of the data collection and the
232 methodology of data collection and data processing, it is important to note that everything
233 started with traditional surveys of the sports clubs.

234 In 2003, a significant conference on the ‘status’ of sports clubs in Flanders was
235 organised by Sport Vlaanderen, the agency responsible for sports policy in Flanders under
236 supervision of the Minister of Sport. Sport Vlaanderen wanted to gather insights from the
237 sports clubs, sports participants, legal form of sports clubs, volunteers and active coaches. In
238 preparation for the conference, a survey was sent out to 19,032 sports clubs, of which 1,480
239 responded, and to the sports services of the municipalities where the response rate was
240 305/308 (or 99%). One of the main results presented at the conference was that in 2003 only
241 about 46% of the coaches of the sports clubs in the survey could be considered as qualified. It
242 is important to note however, that mainly larger, more established sports clubs where only one
243 sport is practiced, responded to the survey. The definition of a qualified coach was also not
244 clear and consequently, some coaches may have been counted as qualified although they were
245 not.

246 In 2012, a new large-scale survey was released to 15,272 active sports clubs in
247 Flanders with similar but also more detailed questions than in 2003. The response was 1,749
248 sports clubs (11.45%), a potential indication that the number of questions was too great and
249 that this way of data collection had reached its limits. Due to more specific questions (better
250 data collection) in this survey, the qualification percentage could be calculated more precise
251 and was pinned at 40.22%.

252 While analysing the results of this survey of 2012, policymakers reported a
253 requirement for more precise data collection and more interactivity within the data. It was
254 suggested that the survey method offered only a high-level overview of active coaches,
255 qualification degree and sports clubs with active coaches. As such, it was not possible to
256 zoom in on regional differences, differences between sports or sports federations, gender and
257 age categories, in order to gather insights in the types of sports clubs with or without qualified
258 coaches; for policymakers this is essential information.

259 As a result, in 2013, a drastic change was made to the way in which data was
260 collected, for example it became mandatory by law to all subsidised sports federations to give
261 a full digital dataset of all active coaches and sports participants to Sport Vlaanderen once a
262 year at a specific date. Sports federations were given the time to start collecting data in a
263 structured way for every sports club which is affiliated to the sports federation. Consequently,
264 the data from 2013 (as a transition year) is rejected for further analysis because the data
265 quality was insufficient. Extra control mechanisms were inserted in the data collection process
266 to improve data quality to the desired quality standards. Data from 2014 onwards match the
267 data quality standards.

268 In the current law, applicable from 2017, two important modifications were made.
269 Firstly, subsidised sports federations are rewarded financially for good data quality and a
270 higher number of qualified coaches in relation with their qualification level. The same
271 obligation of giving a full digital dataset of coaches and sports participants is imposed to the
272 solely recognised (but not subsidised) sports federations since 2017. It is mandatory for sports
273 federations to use a template (Microsoft Excel) for the digital dataset of sports participants
274 and coaches, consisting of following data fields (columns): name and unique ID of the sports
275 federation, unique ID of member (coach or sports participant), name, address, birth date,
276 gender, unique ID or sports club (link with *SportsDB* and extra information, see previous
277 section); sport, recreational or competitive sports participant or not sporting member,
278 indication if the person is a coach. Only for the coaches in the dataset, an extra data field with
279 the unique ID in *VOTAS* can be added. With this unique ID, the link with the *VOTAS*-database
280 and the qualifications of the coach is established. It is not desirable for sports federations to
281 provide us with the information on the qualifications of the coaches. Sport Vlaanderen (by
282 VTS) owns the database with all the qualifications and it is preferable, because of control
283 mechanisms in the subsidisation process and correctness of the data, that the qualifications are

284 added to the dataset centrally. It is important to point out that a person can have multiple lines
285 in the digital dataset, for example practicing or coaching more than one sport or being active
286 in more than one sports club. However, when the total numbers of sports participants and
287 active coaches in Flanders are counted, they are only counted once.

288 By law, Sport Vlaanderen is allowed to use personal data during the subsidisation
289 process, but after checks and calculations directly related to the subsidisation process, data on
290 coaches and sports participants is anonymised. This is carried out by way of a data cleaning
291 and anonymisation process. In the time period (e.g., data from 2019) between delivering the
292 dataset to Sport Vlaanderen (it is obliged for sports federations to do this no later than January
293 31, 2020) and the end of the subsidisation process (June 30, 2020), most of the work in the
294 data cleaning process is year-over-year corrections where coaches from the previous year are
295 matched with the same coach in the current year, within or between sports federations. This is
296 a really important step because personal data is not uploaded (e.g., name, birthday, address) to
297 *CoachDB*, but an encrypted unique key for every person (UniquePersonID) which cannot be
298 traced back to personal data. During upload, birthdays are translated to year of birth and
299 address is translated to a municipality. Data is anonymised but the number of unique coaches
300 or sports participants can be counted, using calculations based on the UniquePersonID. A
301 second major part of the data cleaning process is linking the information of *CoachDB* with
302 *VOTAS* and adding the flag 'qualified' or 'non-qualified' for every coach and listing for every
303 UniquePersonID the PE-qualification or VTS-qualification. Because this information is stored
304 in different fields, information can be combined. By this subsidisation process, data cleaning
305 and connections between the databases *SportsDB*, *CoachDB* and *VOTAS*, Sport Vlaanderen
306 combines the data of all active coaches and their qualifications in more than 17,000 sports
307 clubs affiliated with more than 70 sports federations, coaching in more than 100 sports and
308 disciplines. Because it is mandatory, not a single sports federation has ever skipped a year and

309 so longitudinal data is now available from 2014 to 2019. It is argued that this is a unique
310 feature of the work.

311 Data quality and completeness is essential for both policy purposes and ongoing
312 scientific analysis. A lot of effort has been invested in improving data quality over the last
313 years, this includes: providing a template file, data improvement by sports federations,
314 feedback on data problems encountered by Sport Vlaanderen to the sports federations, huge
315 investments in data cleaning by Sport Vlaanderen, and modifications in the subsidisation
316 process to reward sports federations for better data quality. Problems cannot be completely
317 avoided considering the volume of coaches or sports participants, but error margins are
318 monitored annually and interventions are made if necessary. Due to this, the data is
319 considered reliable, yet it should be noted that it has taken a period of eight years to achieve
320 this. Equally, over that period of time, it has become clear that sports federations require
321 reward for their efforts in contributing to a clean and comprehensive dataset. Consequently,
322 interactive dashboards are offered to sports federations at no-cost and have been used by them
323 to develop their own internal policy. Collaborating in this way to bring about desirable
324 outcomes for all stakeholders is seen as a win-win situation.

325 As explained in the above paragraphs, FICOMS is located against the unique backdrop
326 of Flanders and it is often many of the features of this context (e.g., the law) which make it
327 work. However, we argue that there is much to learn about the principles of FICOMS and
328 suggest that similar effective monitoring and evaluation systems can be designed elsewhere
329 with similar results. The focus of the following section is to demonstrate emerging insight and
330 early possibilities of FICOMS by presenting a number of very brief introductory case studies
331 (CS) around specific areas of work. For example, the number of coaches obtaining
332 qualifications (CS1), bridging the gap between qualified and non-qualified coaches in sports
333 clubs (CS2) and finally, the drop out of coaches from sports coaching roles (CS3).

Emerging Insight from FICOMS

334
335 Case study 1 (CS1) demonstrates that in 2019, more than 7,000 coaches entered one of
336 the 230 coach education programmes of VTS. With a success rate of around 86%, 6,028 of
337 them obtained a VTS-qualification. The success rate is depending on the sports and level
338 (Aspirant-Initiator to Trainer A). The current most popular sports in coach education are:
339 soccer, tennis, gymnastics, horse riding, athletics, hockey, basketball, swimming and
340 volleyball. Close to 64% of the coaches obtaining a qualification are male. The average age of
341 coaches is almost 30 years but increases for the higher levels of coach education programmes
342 (figure 4). The most popular pathway for obtaining a coach qualification is following a
343 regular course under supervision of coach developers and with an exam and apprenticeship at
344 the end of the course. Between 2015 and 2019, 26,326 coaches (89% of all qualifications)
345 chose this track, 13,820 following a coach education programme at the level of Initiator.
346 Almost 11% of the coaches obtaining a VTS-qualification have a PE-qualification (Sport
347 Vlaanderen, 2020).

348 Case study 2 (CS2), concerned with active coaches operating in sports clubs,
349 illustrates that in 2019 only 8,234 (<50%) of the 16,982 sports clubs affiliated with the sports
350 federations have active coaches ([https://www.sport.vlaanderen/kennisplatform/thema-
351 trainers/db-coaches-active-in-flanders-belgium/](https://www.sport.vlaanderen/kennisplatform/thema-trainers/db-coaches-active-in-flanders-belgium/)). In sports clubs of walking, recreational
352 cycling or jogging and indoor soccer, it is clear that hardly any coaches are active. The
353 number of sports clubs with coaches increased from 7,360 in 2014 to 8,234 in 2019 (+11.9%)
354 and the number of sports clubs with at least one qualified coach increased from 4,797 in 2014
355 to 5,699 in 2019 (+18.8%). This is a positive evolution for quality at sports club level. To put
356 this in perspective, organised sports participation in Flanders increased with 16.9% from 2014
357 to 2019 (increase from 1,239,625 to 1,448,514 sports participants). The number of sports
358 clubs with sports participants increased with 10.6% from 2014 to 2019. During recent years, it

359 was often claimed in Flemish media that there is a lack of qualified coaches in Flanders (e.g.,
360 Decré, 2019; Le Bacq, 2019). FICOMS has been used to analyse the available data and
361 identify an increase of 22.6% in active coaches and an increase of 37.5% in qualified coaches
362 from 2014 to 2019 (figure 5). It has been difficult to measure exactly how much of an issue
363 the lack of qualified coaches is. However, FICOMS revealed some insights how the gap is
364 being partially closed due to a greater number of sports clubs with (qualified) coaches and the
365 ratio of the amount of coaches versus amount of sports participants that increased from 0.0466
366 to 0.0489 (+4.9%). Another parameter which is monitored closely through FICOMS, is the
367 average number of coaches in sports clubs, which increased from 4.27 in 2014 to 4.57 in 2019
368 (+7.0%) and the average number of qualified coaches in sports club which increased from
369 1.71 in 2014 to 2.06 in 2019 (+20.5%). The policy of increasing the number of active
370 qualified coaches can only succeed if there is positive balance between new qualified coaches
371 and drop out of (qualified) coaches. It is observed with FICOMS that more coaches are
372 engaging with coach education every year, leading to more coaches in sports clubs obtaining a
373 coach qualification. In 2014 there were 1,254 sports clubs with at least one coach obtaining a
374 new qualification; in 2019, this number increased to 1,414 sports clubs (+12.8%).

375 Case study 3 (CS3) with FICOMS revealed that the average drop out of coaches in
376 2019 is 20.6%, where it peaked at more than 23% in 2016, so drop out is decreasing slowly
377 (figure 6). During analysis of coach drop out, FICOMS made it possible to look at the profile
378 of qualified vs. non-qualified coaches. In 2014, non-qualified coaches were on average 2
379 years older than qualified coaches (41.2 vs. 39.2 years old). In 2019, qualified coaches instead
380 were on average 2 years older than non-qualified coaches (39.7 vs. 37.7 years old). As such,
381 this is an indication that in the period between 2014 and 2019 more non-qualified coaches
382 stopped coaching (drop out) than qualified. Gender differences reveal that female coaches are
383 more than 9 years younger than male coaches (32.5 vs. 41.8 years old), there are less female

384 qualified coaches (28.1%) than female non-qualified coaches (37.8%) and the drop out of
385 female coaches is higher than for male coaches. The drop out of non-qualified coaches is
386 significantly higher (26.1% vs. 13.9%) than for qualified coaches, which is an important
387 reason for the increase in the qualification ratio of our coaches in Flanders between 2014
388 (40.3%) and 2019 (45.2%).

389 Within this section, by means of three case studies, we have illustrated the early
390 possibilities of FICOMS. By this we mean, how FICOMS can generate detailed appropriate
391 insight which can be used for stakeholder action/intervention. For the first time, insight is
392 available in relation to the throughput and output of our coach education system in Flanders.
393 Consequently, it becomes possible to monitor the characteristics of all the coaches obtaining
394 qualifications (CS1), if and which sports clubs are bridging the gap on qualified coaches
395 (CS2) and monitor the evolution of the drop out of coaches (CS3).

396 **Limitations and future directions**

397 At the end of this article describing the possibilities and early insights of FICOMS, it
398 is important to point out what we perceive to be the main limitations. The ‘I’ in FICOMS
399 represents interactivity. Currently, data are shown in tables, graphs and maps where some
400 interactivity is possible, but we wish to expand this with functionality to export data, print pdf
401 reports, add tooltips and provide drill-through or zoom-in possibilities on specific data. This
402 will represent necessary major improvements for researchers, sports federations, sports
403 services at the municipalities and policymakers. At present, data is only obtained from
404 coaches of the sports clubs linked with recognised sports federations. Information is missed
405 on fitness clubs, some of the outdoor facilities and the non-organised sports sector.
406 Additionally, it is not possible to monitor the amount of training hours for every coach and
407 which athletes/teams are coached by which coach. Being able to do this would be beneficial

408 because we can then calculate the proportion of training hours with qualified coaches in
409 relation to the amount of training hours with non-qualified coaches.

410 Within this paper we have made the case that FICOMS is already a powerful tool and
411 an essential instrument for policymakers, sports federations, sport services at the
412 municipalities and researchers in Flanders. However, while we believe that this represents a
413 significant story for monitoring and evaluation in coach education, plans exist to extend this
414 work even further. At short notice, there is a desire to use FICOMS to monitor the impact of
415 certain events (e.g. COVID-19) on coaches entering (input) our coach education system, the
416 number of coaches obtaining qualifications (throughput) and on sports coaching in the sports
417 clubs (output) in Flanders. FICOMS can be utilised for in-depth analysis, drawing conclusions
418 and altering our coach education programmes where necessary, all in an agile and responsive
419 manner. Further, FICOMS will be integrated with other data sources presented in figure 1,
420 such as data on elite sport, sport at/after school, talent detection programmes, sport in nature,
421 sport at work, etc. There is an intention to understand what the common characteristics are of
422 people doing sport in an organised context (e.g. sports clubs) and in a non-organised sports
423 context (e.g. at/after school, in nature, at work, etc.). By finding common characteristics, we
424 can give policy advice to stimulate people transitioning from one context to another under
425 supervision of coaches if applicable.

426 Next, there is an ambition to accelerate the process of importing new data on coaches
427 in FICOMS to give sports federations, policy makers, researchers and sports services at the
428 municipalities quicker insights in trends. At present, there is access to data of six consecutive
429 years, but along with importing more years, a longer-term analysis can be done. This will
430 make it possible to evolve FICOMS from a descriptive tool to a predictive or prescriptive tool
431 using new methods like artificial intelligence, interactive correlation plots or regression
432 analysis, etc.

433 Finally, there is desire to benchmark the Flemish data with international data on the
434 characteristics of coaches; for example, gender differences, qualification level and in the most
435 popular sports, drop out of coaches.

436 **Conclusion**

437 Within the present article we have described why FICOMS has been developed and
438 how it has assisted Sport Vlaanderen (along with many other stakeholders) to understand the
439 impact of the coach education system within VTS. By describing the main characteristics of
440 FICOMS and the early insights by means of three case studies, we wanted to illustrate that the
441 insights generated are not only useful in Flanders but have a huge potential for different
442 stakeholders, such as governments, policymakers, sports federations, Olympic committees,
443 education partners, municipalities and researchers. Nevertheless, there are some current
444 limitations and considerations to be taken into account and these have been described. Within
445 our future work we intend to share a much more detailed series of case studies similar to those
446 considered with brevity above.

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References

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460

461

Callary, B., & Gearity, B. (2019). Coach developer special issue: global perspectives in coach education for the coach developer. *International Sport Coaching Journal*, 6(3), 261-262.

462

463

Campbell, S., & Waller, S. (2020). Systematic Review of the Contemporary Research on Coach Development Programs. *International Journal of Coaching Science*, 14(1), 3-38.

464

465

466

Ciampolini, V., Tozetto, A. V., Milan, F. J., Camiré, M., & Milistetd, M. (2020). Lifelong learning pathway of a coach developer operating in a national sport federation. *International Journal of Sports Science & Coaching*, doi:

467

[10.1177/1747954120912384](https://doi.org/10.1177/1747954120912384)

468

469

470

Coopoo, Y., & Morris-Eyton, H. F. (2014). Assessing the needs of coaches in developing a coach education framework. *African Journal for Physical Health Education, Recreation and Dance*, 20(1), 1-10.

471

472

473

Cushion, C. J., Armour, K. M., & Jones, R. L. (2003). Coach Education and Continuing Professional Development: Experience and Learning to Coach. *Quest*, 55(3), 215-230. doi: [10.1080/00336297.2003.10491800](https://doi.org/10.1080/00336297.2003.10491800)

474

475

Cushman, G., Veal, A.J., & Zuzanek, J. (2005). *Free time and leisure participation: international perspectives*. Wallingford: CABI Publishing, pp. 1-298.

476

477

Decré, H. (2019, February 22). Sportclubs massaal op zoek naar trainers: "Nood aan goede trainers is groot". VRT NWS. Retrieved from

478

<https://www.vrt.be/vrtnws/nl/2019/02/22/groot-tekort-aan-trainers-bij-sportclubs/>

479

480

481

Duffy, P., Hartley, H., Bales, J., Crespo, M., Dick, F., Vardhan, D., & Curado, J. (2011). Sport coaching as a 'profession': challenges and future directions. *International Journal of Coaching Science*, 5(2).

482 Erickson, K., Bruner, M. W., MacDonald, D. J., & Côté, J. (2008). Gaining insight
483 into actual and preferred sources of coaching knowledge. *International Journal of Sports*
484 *Science & Coaching*, 3(4), 527-538.

485 Estonian Foundation of Sports Education and Information. (2020). *Eesti*
486 *Spordiregister*. Retrieved from: <https://www.spordiregister.ee/en/treener>

487 European Commission. (2020). *EU Work Plan for Sport (2017-2020) - Expert group*
488 *on skills and human resources development in sport: Guidelines regarding the minimum*
489 *requirements in skills and competences for coaches (February 2020)*. doi: [10.2766/69405](https://doi.org/10.2766/69405)

490 Eurostat. (2019). Retrieved from <https://ec.europa.eu/eurostat/data/database>

491 Galatti, L., Bettega, O. B., Brasil, V. Z., de Souza Sobrinho, A. E. P., Bertram, R.,
492 Tozetto, A. V. B., Rodrigues, H.A., Collet, C., Nascimento, J., & Milistetd, M. (2016).
493 Coaching in Brazil sport coaching as a profession in Brazil: an analysis of the coaching
494 literature in Brazil from 2000-2015. *International Sport Coaching Journal*, 3(3), 316-331.

495 Gratton, C., Rowe, N., & Veal, A.J. (2011). International Comparisons of Sports
496 participation in European Countries: an Update of the COMPASS Project. *European Journal*
497 *for Sport and Society*, 8(1-2), 99-116.

498 Harris, K. (2018). Building sport for development practitioners' capacity for
499 undertaking monitoring and evaluation—reflections on a training programme building capacity
500 in realist evaluation. *International Journal of Sport Policy and Politics*, 10(4), 795-814.

501 International Council for Coaching Excellence. (2013). *The International Sport*
502 *Coaching Framework Version 1.2* (pp. 1-60). Champaign: Human Kinetics.

503 Lara-Bercial, S., North, J., Hämmäläinen, K., Oltmanns, K., Minkhorst, J., & Petrovic,
504 L. (2017). *European Sport Coaching Framework*. Champaign: Human Kinetics, pp. 1-75.

505 Le Bacq, T. (2019, September 9). Nog nooit zoveel volk in sportclub, nog nooit zo'n
506 nood aan trainers. *Het Nieuwsblad*, p. 6.

- 507 Mallett, C. J., Trudel, P., Lyle, J., & Rynne, S. B. (2009). Formal vs. informal coach
508 education. *International Journal of Sports Science & Coaching*, 4(3), 325-364.
- 509 Milistetd, M., Ciampolini, V., Salles, W. D. N., Ramos, V., Galatti, L. R., &
510 Nascimento, J. V. D. (2016). Coaches' development in Brazil: Structure of sports
511 organizational programmes. *Sports Coaching Review*, 5(2), 138-152.
- 512 Morris-Eyton, H. F., & Roux, C. J. (2019). Curriculum development in sport coach
513 education within a South African context: a case study. *South African Journal for Research in*
514 *Sport, Physical Education and Recreation*, 41(2), 87-96.
- 515 North, J. (2016). *Benchmarking sport coach education and development. Advances in*
516 *Coach Education and Development: From Research to Practice*, 17.
- 517 Piggott, D. (2012). Coaches' experiences of formal coach education: a critical
518 sociological investigation. *Sport, Education and Society*, 17(4), 535-554.
- 519 Santos, F., Camiré, M., MacDonald, D. J., Campos, H., Conceição, M., & Silva, A.
520 (2019). Process and outcome evaluation of a positive youth development-focused online
521 coach education course. *International Sport Coaching Journal*, 6(1), 1-12.
- 522 Sports coach UK. (2009). *The coaching workforce 2009-2016*. Sports coach UK,
523 Leeds, pp. 1-150.
- 524 Sport Vlaanderen. (2020). Data Warehouse Sport Vlaanderen. Retrieved from
525 <https://www.sport.vlaanderen/kennisplatform/>
- 526 Stodter, A., & Cushion, C. J. (2017). What works in coach learning, how, and for
527 whom? A grounded process of soccer coaches' professional learning. *Qualitative Research in*
528 *Sport, Exercise and Health*, 9(3), 321-338.
- 529 Vangrunderbeek, H. & Ponnet, H. (2020). The History of Coach Education in
530 Flanders. *International Sport Coaching Journal*, 7(3), 380-389. doi: [10.1123/iscj.2020-0049](https://doi.org/10.1123/iscj.2020-0049)
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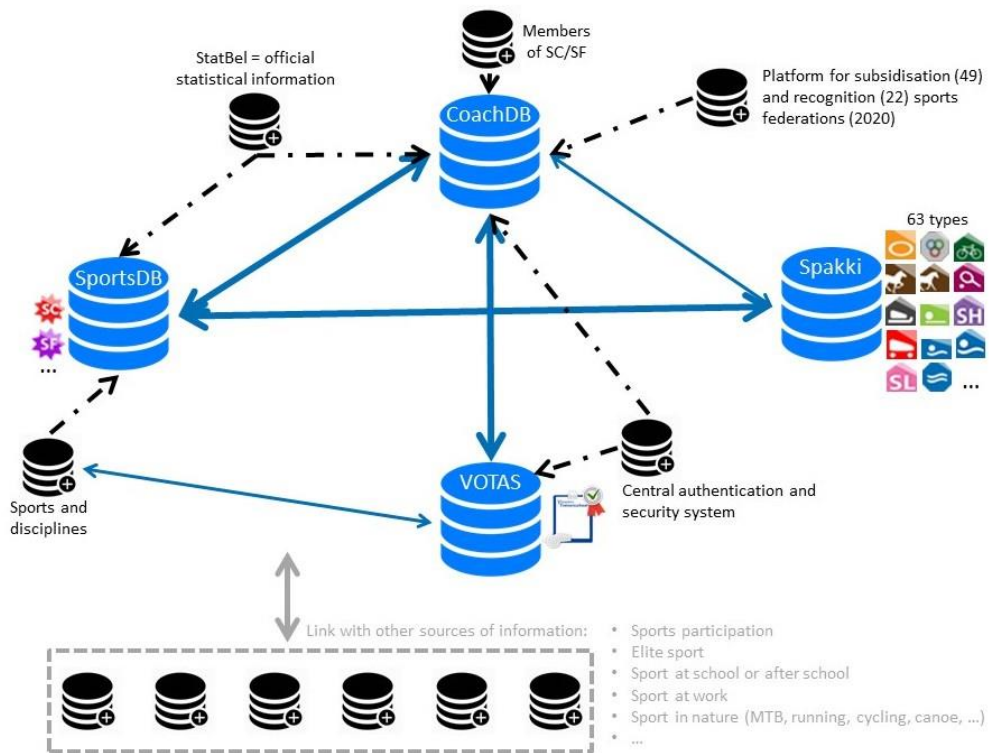
532 **Table 1**533 *Papers published within ISCJ section 'Coaching in...' (2014-2020)*

N°	Coaching in	Continent	Year & Issue	Authors
1	South Africa	Africa	2014 (1), 33-41	Jerry Segwaba, Desiree Vardhan and Patrick Duffy
2	Singapore	Asia	2014 (2), 94-102	Koon Teck Koh, Wenxiang Foo, Goken Sakamoto and Adrian Low
3	Brazil	South-America	2014 (3), 165-172	Michel Milistetd, Pierre Trudel, Isabel Mesquita and Juarez Vieira do Nascimento
4	Poland	Europe	2015 (1), 50-63	Ryszard Panfil, Marcin Krawczynski, Piotr Marek and Lukasz Panfil
5	Sweden	Europe	2015 (2), 187-191	Marie Hedberg
6	New Zealand	Oceania	2015 (3), 330-338	Lynn Kidman and David Keelty
7	Ireland	Europe	2016 (1), 65-74	Fiona Chambers and Robin Gregg
8	Portugal	Europe	2016 (2), 178-183	Rui Resende, Pedro Sequeira and Hugo Sarmento
9	Brazil	South-America	2016 (3), 316-331	Larissa Galatti, Otavio Baggiotto Bettega, Vinícius Zeilmann Brasil, Antonio Evanhoé Pereira de Souza Sobrinho, Rachael Bertram, et al.
10	Finland	Europe	2016 (3), 332-343	Kirsi Hämäläinen and Minna Blomqvist
11	Russia	Europe/Asia	2017 (1), 90-94	Vladislav A. Bepomoshchnov and Leonid V. Mikhno
12	United States	North-America	2017 (2), 220-234	Bradford Strand, Shannon David, Katie J. Lyman and Jay M. Albrecht
13	Mexico	North-America	2017 (3), 345-352	Ciria Margarita Salazar C., Pedro Julian Flores Moreno, José Encarnación Del Río Valdivia, Lenin Tlamatini Barajas Pineda, Julio Alejandro Gómez Figueroa and Martha Patricia Pérez López
14	Botswana	Africa	2018 (1), 79-83	Tshepang Tshube and Stephanie J. Hanrahan
15	Ireland	Europe	2018 (2), 183-191	Niall O'Regan and Seamus Kelly
16	Spain	Europe	2018 (3), 281-292	Sebastián Feu, Javier García-Rubio, Antonio Antúnez and Sergio Ibáñez
17	Spain	Europe	2019 (1), 110-125	Sergio J. Ibáñez, Javier García-Rubio, Antonio Antúnez and Sebastián Feu
18	United States	North-America	2019 (2), 220-225	Lori A. Gano-Overway and Kristen Dieffenbach
19	Brazil	South-America	2019 (3), 339-348	Larissa R. Galatti, Yura Yuka Sato dos Santos and Paula Korsakas
20	Brazil	South-America	2020 (1), 82-88	Patricia Gaion, Michel Milistetd, Fernando Santos, Andressa Contreira, Luciane Arantes and Nayara Caruzzo
21	United States	North-America	2020 (1), 89-94	Lori Gano-Overway, Pete Van Mullem, Melissa Long, Melissa Thompson, Bob Benham, et al.
22	United States	North-America	2020 (2), 239-251	Bradley Fawver, Garrett F. Beatty, John T. Roman and Kevin Kurtz
23	Belgium	Europe	2020 (3), 380-389	Hans Vangrunderbeek and Hans Ponnet

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535 **Figure 1**

536 *Database structure behind FICOMS*

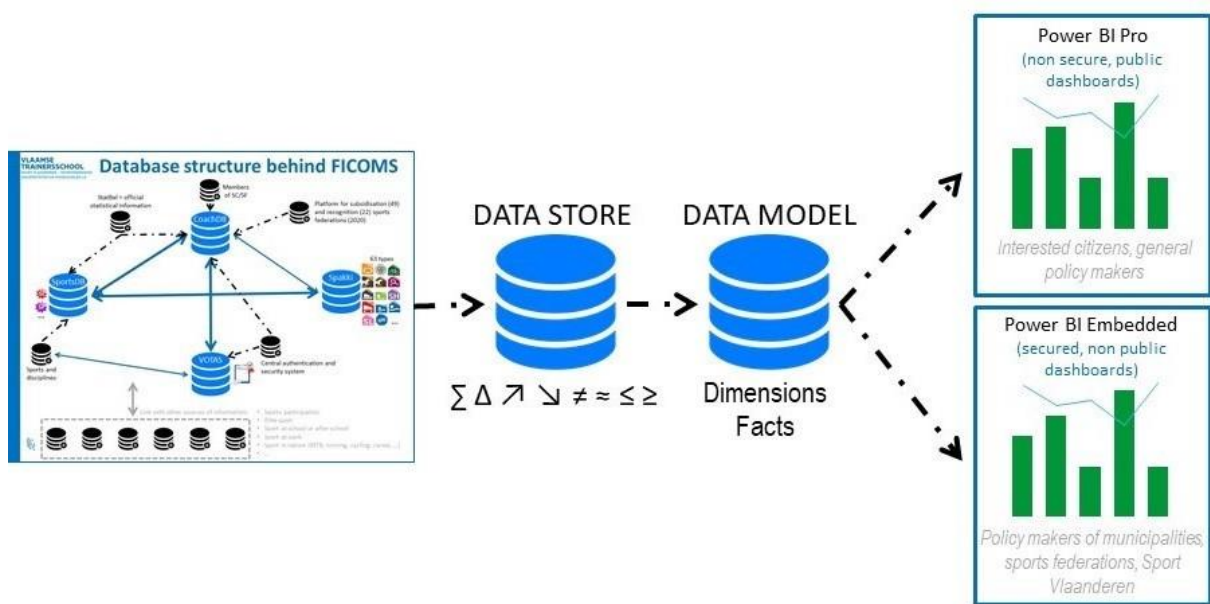


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539 **Figure 2**

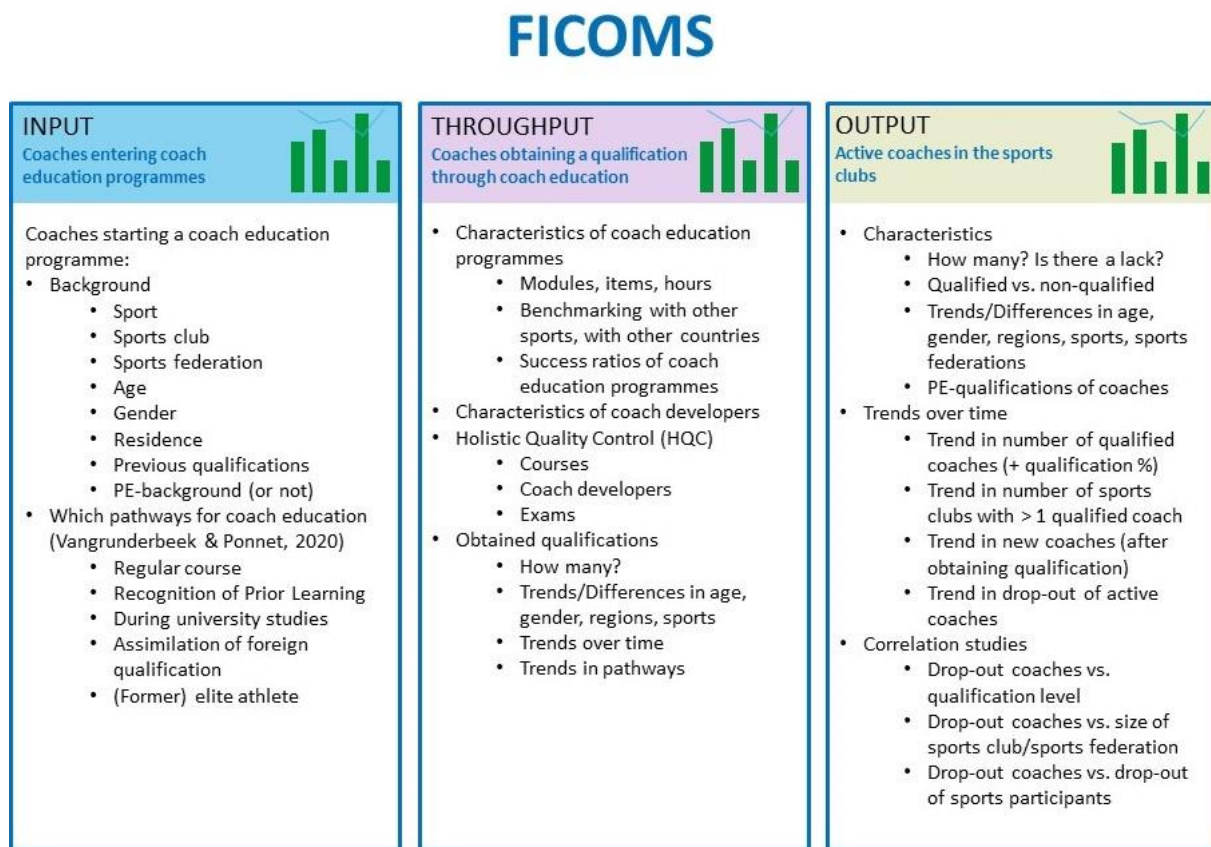
540 *From data to visualisation*



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542 **Figure 3**

543 *Monitoring input, throughput and output via FICOMS*

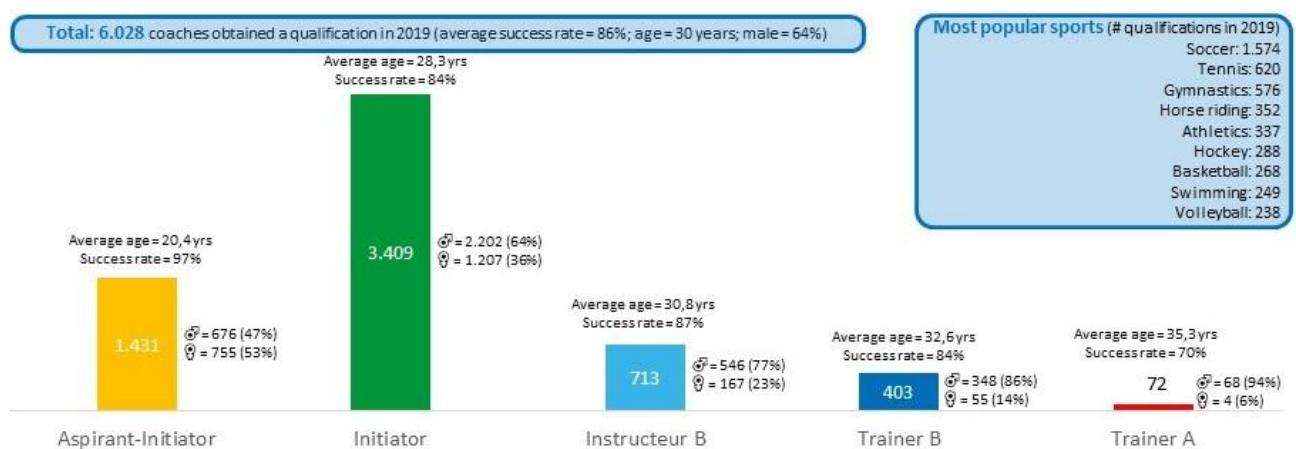


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546 **Figure 4**

547 *FICOMS dashboard on coach education insights (2019)*



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550 **Figure 5**

551 *FICOMS dashboard on active, qualified and non-qualified, coaches operating in sports clubs*
 552 *(2014-2019)*



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555 **Figure 6**

556 *FICOMS dashboard on average drop out of qualified vs. non-qualified; male vs. female*
 557 *coaches (2014-2019)*



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