

Golf Swing Learning Technology: the Impact of Swing Data on Learner Behaviour

Dr Paul TJ James

Graduate School, Bangkok University, Bangkok, Thailand

paul.j@bu.ac.th 02 350 3500 X1619

Abstract- Much has been written in the general media about the impact of new golf technologies on the development and learning of golf skills. However, little empirical data exists on how such technologies are actually used in practice or the extent of the changes or the residual impact of such changes.

This paper assesses how some of the technological developments affect learner motivation and raises issues relating to how such technologies help a learner develop appropriate golf related skills. A computer-based launch monitor system was used to obtain measures of specific data swing data to quantify baseline performance and any subsequent change in performance following the application of the research procedures.

The paper uses a quantitative/qualitative methodology appropriate for exploring views where data is drawn from a group of self-reported novice golfers (with handicaps ranging from 25 to unknown).

The data analysis suggests that learners perceive that having real-time data about their skills performance can help them considerably in terms of confidence building and in their continuing development of general golf shot-making capabilities.

Whilst the limitations of this research outcome relate to the assessment of the views of a small group of novice golfers, the research platform could be better informed if the research profile was expanded to include more advanced skilled golfers, and to possibly assess actual playing changes whilst on-course through more longitudinal research.

Keywords- golf swing learning technologies

INTRODUCTION

Most golfers do not use professional coaching services, and practice on their own. Some golfers use professional coaching services in order attempt to improve their golf swings and reduce their numerical handicaps when playing on real golf courses. However, progress can be slow as many golf teaching professionals question the implicit improvements associated with *only* direct coaching provision and want more effective means to make sure golf swing developments are real, useful and helpful. Consequently, *over the past 5 years, one of the biggest innovations in golf has been the launch monitor* (Longdrivegolf, 2009) and is fast becoming the most important *fitting tool in golf* (Titleist, 2009). Modern learning applications have helped golfers in recent years and these developments have been shown to be supporting the value of proper club fitting and swing optimization through appropriate and timely *launch monitor feedback* (Qualitygolfstats, 2009) thus underpinning the use of newer technological approaches. However, little research has been documented about launch monitor capabilities and their effects on golfer learning and subsequent swing practices.

Method

Two key questions were developed to help focus the research programme. These were:

- 1 What effect does launch monitor data have on a golfer's ability to improve their perceived personal swing characteristics?
- 2 What are golfer's views about the use of a launch monitor during actual practice?

Consequently, the experiment called for a split quantitative/qualitative methodology. Part 1 consisted of generating actual field data at a golf driving range; Part 2 utilised a single focus group of all participants, which lasted for 1 hour and was recorded for later analysis for themes and sub-themes. Further, the notion of small group learning suggests that golf-learners become more active, rather than passive (Rashotte, 2002) when they are surrounded by other similar individuals on a golf driving range, and as such help golfer's become more motivated for this research activity.

Part 1

Eighteen attending participants forming the research group were given 15 minutes to warm-up and as part of the first segment, were then pre-tested to determine actual baseline swing characteristics. Each participant was given a number from 1-18, and in turn, hit their series of 6 balls. All measures were recorded at an outdoor driving range facility with participants hitting shots using a launch monitor. The pre-test involved the recording of 6 individual swings using their own 5-iron. Among the variables being measured by a Golf Launchpad Tour Monitor was club-head speed (CHS); clubface angle at impact (CFA); the launch angle (LA); ball speed (BS) was a result of how "pure" the golfer hit the ball; and distance (D). Club-head speed was measured in mph and was considered a reflection of the velocity of the club-head just prior to ball contact. The clubface angle was measured in terms of the degree of deviation from square at the moment of impact in absolute terms (+ or - ° (degrees) were ignored). The launch angle was measured in terms of the degree of lift given to the ball at ball impact. The ball speed was a result of how well the ball was hit relative to the centre of the club face; and distance in yardage was calculated from the dynamics of the club as it passed through the impact zone and was obtained automatically through the swing analysis software. No

monetary compensation was provided for participation in this study.

In the second segment, follow-up testing procedures were similar to baseline testing in that each participant was asked to hit in turn a series of 6 golf shots with their own 5-iron. In order to help determine the impact of the use of the launch monitor, some participants were given their actual pre-test data feedback but no further advice about a swing change which may have an effect on the quality of their golf swing at this point during the experiment. Consequently, the eighteen participants were divided into 3 equal groups of 6 - Group 1 (swing data shown on a computer screen with no further explanation); Group 2 (swing data given by professional coach with an exchange of views as to the data meaning and shown on the computer screen); Group 3 (no data given).

Results

Figure 1 shows that the club-head speed (CHS) changes from pre- to post examination with an F (2, 33) 0.237, p < .05. Group 1 has increased their average CHS by 4.7%; group 2 by 8.72%; and group 3 had reduced their CHS by 0.71%.

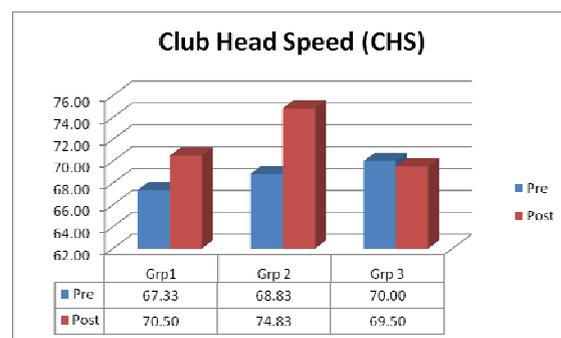


Figure 1

Figure 2 shows that the Club-face angle (CFA) changes from pre- to post examination with an F (2, 33) 0.058, p < .05 and reveals that group 1 had reduced their overall CFA by 3.53%; group 2 by 17.89%; and group 3 had actually increased their CFA by 4.94%.

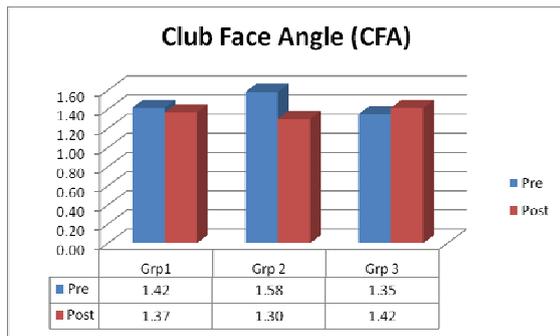


Figure 2

Figure 3 shows that the launch angle (LA) changes from pre- to post examination with an $F(2, 33) 0.064, p < .05$ and reveals that the launch angle of group 1 increased by 2.08%; was reduced by 1.8% in group 2; and in group 3 this was increased by 1.9%.

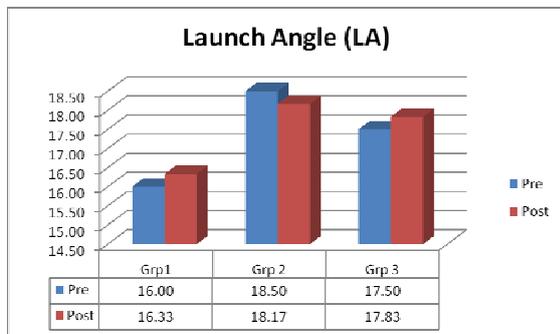


Figure 3

Figure 4 shows that the Ball Speed (BS) changes from pre- to post examination with an $F(2, 33) 0.062, p < .05$ and reveals that group 1 increased their ball speed by 0.74%; group 2 by 8.04%; and group 3 however, reduced their ball speed by 2.47%.



Figure 4

Figure 5 shows that the Distance (D) changes from pre- to post examination with an $F(2, 33) 0.122, p < .05$ and reveals that group 1

increased their overall distance by 3.54%; group 2 by 5.56%; however group 3 decreased their overall average distance by 1.17%.

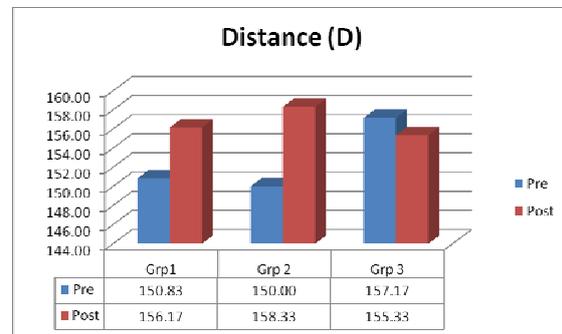


Figure 5

The expectation for all five attributes are as below:

CHS	Increased
CFA	Reduced (absolutely)
LA	More focused (to recommended angle)
BS	Increased
D	Increased

These above indications are suggested as examples of the expectations and serve to demonstrate how improvements would ordinarily be gauged.

Part 2

All eighteen participants contributed to a single focus group. Each sub-group (1, 2 or 3) were asked to explain how they felt about the process they were involved in during the launch monitor evaluation. True to the essence of focus group methodology it was important not to attempt to quantify individual responses but rather to maintain a sense of the whole group within the adopted analysis process (Macleod Clark et al. 1996). Consequently, the numerous responses are amalgamated into a group response for ease of reporting. The various major themes that were raised from the focus group included the following:

- Confidence
- Swing Capability
- Perceived Usefulness
- Swing Knowledge
- Cost
- Knowledge Transfer

These will be discussed in more detail later in the following discussion.

Discussion

The overall outcome from assessing the results of the current study suggest that there were golfer-related benefits to be gained from using a launch-monitor. However, it could be concluded that the overall benefits from the specific advantages that the launch-monitor offers differs for each group. For example, in group 1 where only data was shown, there was an overall benefit to the golfers in all areas examined. In group 2, more fundamental changes occurred as it would appear that this group understood more fully what it was that they needed to do to change in order to make better swings and gain more distance as well as create more effective swing consistency. In group 3, which had the least intervention in terms of personal performance and data acquisition, it would appear from the results that most of the golfers seemed to get worse. This may be attributed to residual attempts at getting better, but may also reflect their own innate need to compete with the other golfers in the other two groups.

It would appear that the most effective outcome comes from group 2, who had demonstrated significant gains in CHS (+8.72%), reduced CFA (-17.89%), leading to a more focused LA (-1.8%), with an increased ball speed BS (+8.04%) resulting in an increase in distance D (+5.56%). This possibly illustrates that the more appropriate the learning conditions (real-time data and live coaching) the better the outcome. However, group 1 also showed improvements solely based on their engagement with the golf technology alone. These are illustrated as gains in CHS (+4.7%), reduced CFA (-3.53%), moderately increased LA (2.08%), with an increased ball speed BS (+0.74%) resulting in an increase in distance D (+3.54%). These outcomes are summarised in Table 1, below, and are also illustrated in Figure 6:

TABLE 1

Group	1	2	3
CHS	+4.7%	+8.72%	-0.71%
CFA	-3.53%	-17.89%	+4.94%
LA	2.08%	-1.8%	+1.90%
BS	+0.74%	+8.04%	-2.47%
D	+3.54%	+5.56%	-1.17%

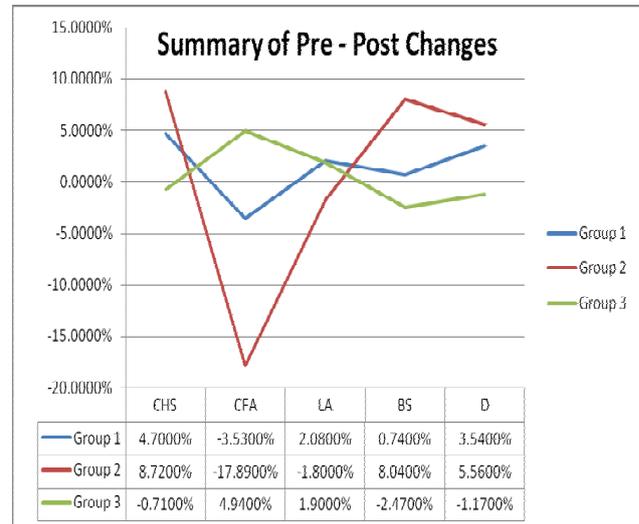


Figure 6

The results demonstrate the positive effects of golf technology such as the launch monitor in the golf-swing learning environment and discernibly shows that that this appears to go beyond mere influence of innate golf knowledge or technical skill (compare, for example, group 2 with group 3). While it could be argued that the use of the launch-monitor may increase confidence per se – the so called technology effect - if this was the sole variable behind the performance changes, the outcomes should have shown more positive performance changes in group 3 in terms of overall swing-performance and consistency. The results did not show this. Nevertheless, the effect cannot completely be ruled out that increased confidence in one’s equipment has on performance. However, in this case, since all groups were exposed to the technology, then the confidence factor would have involved all groups to some extent. Further research on confidence and its effects, as it pertains to golf technologies, may help clarify this issue. An assessment of the focus group outcomes are illustrated below. The following main

themes were raised and are discussed accordingly.

Confidence

For groups 1 and 2, the data outcomes from using the launch-monitor appeared to be reinforced, as each group suggested that the actual data was very useful to them in *quickly working out what may help them change to produce a better swing performance*. Group 3, who were blind to the actual data, reportedly relied on their *instincts* to work out what was needed and there was *insufficient time* (6 shots only) to make the necessary changes they felt that were needed. Consequently, golfers working on their swing characteristics on driving ranges may actually be hurting their swing development if they do not utilise more objective technologies such as a launch monitor.

Swing Capability

Group 1 suggested that as novice golfers they *needed as much help as they could get* with the development of their swing dynamics. Group 2 further reported that both the visual and the coaching elements together *allowed them to develop a better understanding of their own capabilities* and these together also showed *what they were doing in a practical situation*. Group 3 reported that *lack of data feedback* may have contributed to their *confusion* in managing their swing change capability which resulted in their lowered overall performance in the second segment of the experiment.

Perceived Usefulness

Group 1 suggested that it was *fairly difficult for them to interpret the data outcomes* as data without explanation could result in more *overall confusion*. However, it was recognised by this group that *accurate data once understood* may be seen as *very beneficial*. Group 2 indicated that the *coach was a vital element* in the translation of the data to more useful swing outcomes; and group 3, indicated that the *lack of data allowed them to think too much about their*

swing which appeared to correlate with the notion of “swing paralysis due to mental analysis” – sometimes suffered by PGA Tour Professionals.

Swing Knowledge

Group 1 suggested that their *swing knowledge had increased* but could not rule out that their *lack of effective interpretation* may have been a contributory factor in reducing this knowledge demonstrated through *less improvement than they first imagined*. Group 3 suggested that with limited knowledge of their swing characteristics in the first place, this *may have played a part in their relative poor performance*. In contrast, group 2 indicated that their performances were affected by *what they saw and what they learned from the coach* in terms of the explanation. These together were perhaps demonstrable in helping improve their overall performances.

Cost

There was a unanimous agreement that that for aspiring golfers, that *such technology may be implicitly necessary* in order to ensure that swing changes are made to increase swing performance – and that this was *considerably superior* to the data vacuum experienced by group 3. Consequently, the residual benefits from *knowing one's swing intimately* outweigh the relative costs of the equipment. When confronted with the results, group 3 suggested that as long as the *cost was reasonable*, that they had become convinced of the effects of the technology.

Knowledge Transfer

Over time, it was reported by most of the respondents that the possibility that *significant changes* could be made to swing performance. Group 3 agreed that without such technologies *it may be difficult* for the swing coach to persuade the *learner to make fundamental changes* to their developing swing and that through such technologies there would be an appropriate positive knowledge transfer – *personal, mechanical*

and behavioural. Group 2 suggested that it would now be more difficult to just hit balls on a driving range without any particular learning requirement as most wanted to learn *in a way that enhances their specific swing characteristics*. Group 1 appreciated that *technology is beneficial* to golfers at all levels and most indicated that they would *use them when available*.

The focus group also illustrated how an effective process it was, as the transcript produced 11,000 words in total. A minority of golfers suggested that introducing IT and technology into the golf game, has ruined an otherwise *esoteric past-time*. However, the majority of golfers agreed that such technology as the launch monitor may now be *invaluable to younger people and to novice golfers world-wide*.

CONCLUSION

While the current study has provided evidence in support of using data created through the use of the launch-monitor, the launch monitor still doesn't appear to replace what a golfer sees and feels and the application of this is quite evident in the demonstrated outcomes from all three groups. The outcome from the qualitative enquiry also produced an interesting outcome as shown in Figure 7, below.

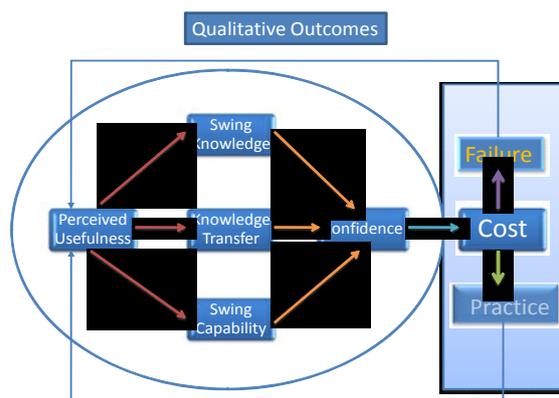


Figure 7

The above model indicates how the main themes may have interacted to lead to a golfer's assessment of the cost(s) associated with developing a golf swing. Both of these

main attributes of cost – failure and practice – suggest that golfers contemplate the effect of pursuing golf-swing progress in these general terms.

Of further interest is the aspect of the important role of the group facilitator (Burrows & Kendall, 1997) as without an effective process the investigation could not be managed appropriately.

There would appear to be several limitations in the design of this investigation that should be noted. First the data were collected in a real golf-driving range environment that had many distractions and environmental factors. It is nonetheless important to recognize that not seeing the actual ball flight may have also influenced the results tabled here. A visual-cue may have been crucial in associating the launch-monitor data with consequent swing/performance outcomes. This may have raised a mediating issue of why group 3 fared so poorly overall.

The results of the current study are considered relevant only to the use of a launch-monitor system, and care should be used in inferring the outcomes to other golf technologies/methods. It should also be noted that another issue revolves around the effect of appropriately fitted clubs and any consequent fitting procedures employed therein. In this respect, it is assumed that since the clubs remained unchanged throughout the whole experimental procedure that their effects were mitigated or at least reduced. Consequently, the effects of such features, alone or in combination with the others, is as yet unknown.

The notion of appropriate feed-back through real-time data reflecting actual swing performance has been assessed here. Consequently, the outcomes indicate that careful instruction relating to appropriate swing data creates a more informed learning environment for golfers to learn about their respective swing performances and that golfers should be encouraged to choose to develop their swing characteristics using such technologies in tandem with a professional golf coach.

REFERENCES

Burrows D. & Kendall S. (1997). Focus groups: What are they and how can they be used in nursing and health care research? *Social Sciences in Health*, 3, pp.244–253.

Longdrivegolf. (2009). Available from: <http://www.longdrivegolf.co.uk/index.php/Launch-Monitors.html>. Last retrieved, January 20th, 2009.

Macleod Clark J., Maben J. & Jones K. (1996). The use of focus group interviews in nursing research: issues and challenges. *NT Research*, 1, pp.143–153.

Qualitygolfstats. (2009). Available from: <http://www.qualitygolfstats.com/optimalflight.html>. Last retrieved, January 6th, 2009.

Rashotte L.S. (2002). Service Learning in a Small Groups Course. *Sociological Practice: A Journal of Clinical and Applied Sociology*, 4(1), pp.79-87.

Titleist. (2009). Available from: <http://www.titleist.co.uk/technology/launchmonitor.asp?bhcp=1>. Last retrieved, January 15th, 2009.

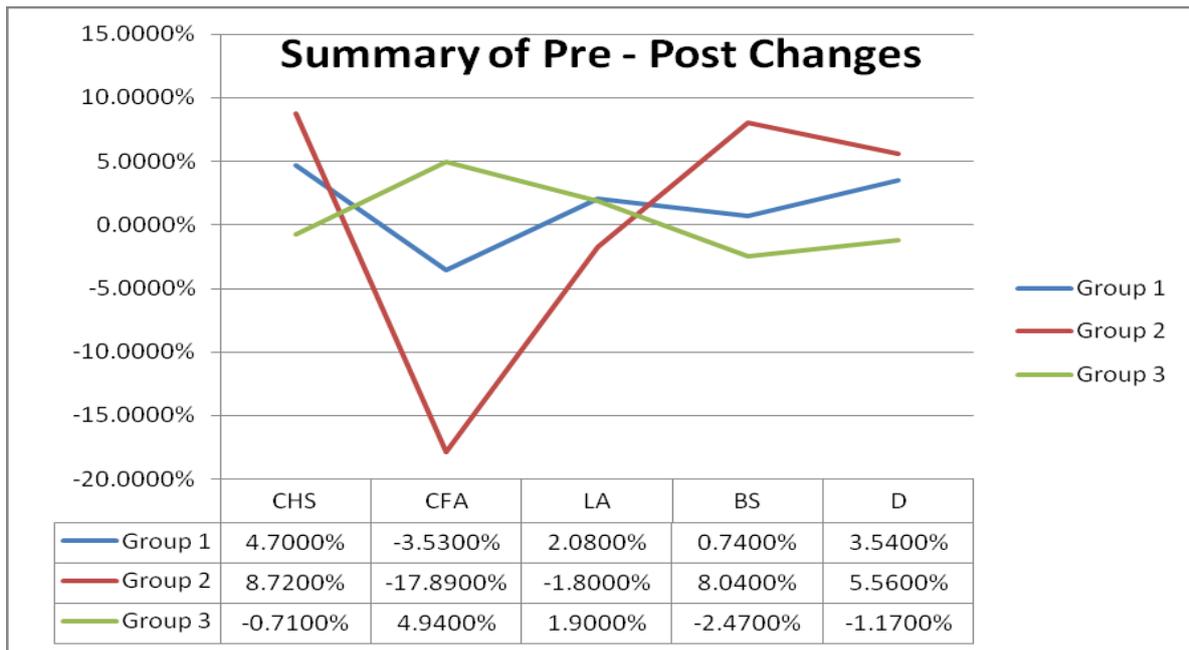


Figure 6

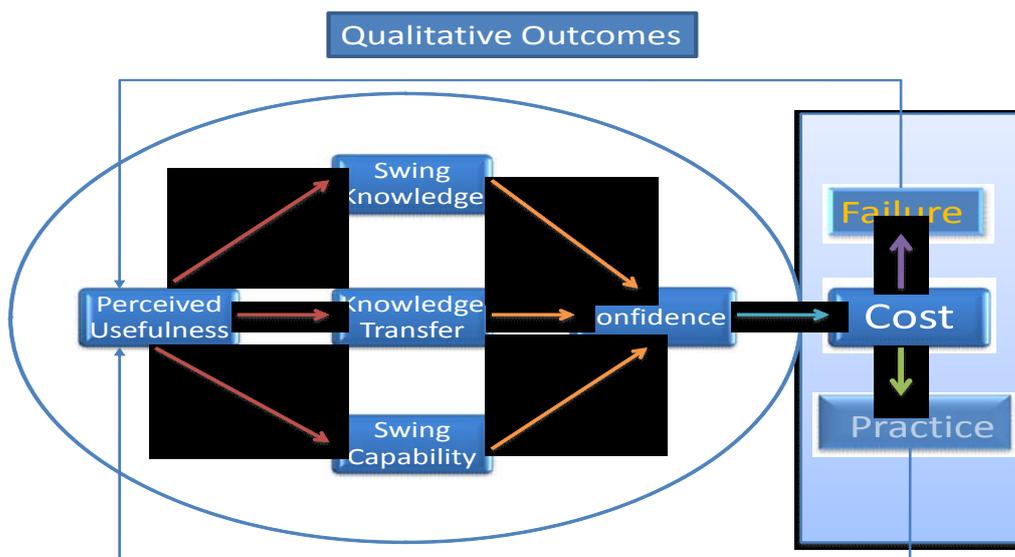


Figure 7