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Advantages of making a SELFIE - Self Evaluation Learning Framework in Exams

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Advantages of making a S.E.L.F.I.E. Self Evaluation Learning Framework in Exams

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Project Objective

To analyze the effects of **student self-estimation** in examinations on overall class performance and progress.

Background Issues

Problems arose in a senior technical engineering course with a steep learning curve for laboratory tool components:

- ❖ Wide range of student background experience and skills.
- ❖ Initial student discouragement has unnecessary negative impact on perception of course and engagement level.
- ❖ Initial disconnect between interest and performance but previous courses have ended in high average GPA.

Methodology to Solve Student Concerns

- ❖ Provide formal opportunity for students to perform self evaluation (S.E.L.F.I.E.s) as part of quizzes and exams.
- ❖ Provide formal opportunity for students to generate an updated post-exam self evaluation after receiving exam solutions.

Qualitative Student Benefits

- ❖ Provide deeper understanding of individual strengths.
- ❖ Address possible knowledge gaps.
 - Accurate Prediction: Students understand what they know and don't know.
 - Over Prediction: Students believe they understand, but don't!
 - Under Prediction: Students believe they don't know, but do!
- ❖ Bonus mark incentive for accurate predictions within 10% of actual mark per question and, since individual errors cancel, a more accurate overall mark prediction.
- ❖ Students encouraged to make effort changes based on discrepancies between self prediction and performance.

Earned Mark Analysis (EMA) [1]

- ❖ EMA: adaption of the Earned Value Analysis (EVA) process management tool to monitor the delays and completion rates of software engineering projects in Watt Humphreys' Personal Software Process (PSP).
- ❖ Students can use EMA tool to provide:
 - Insight into probable progress relative to earlier classes.
 - Plan their individual performance for the course.
 - Track actual performance from initial difficulty to final success against their planned performance.
- ❖ Students can decide to boost marks by doing additional research in course area through optional, preannounced "Make-up your own final exam question and answer it".

Analysis of S.E.L.F.I.E. Results (Based on [2])

Data from recent U of C engineering embedded systems courses gathered according to CFREB policies.

Student response to Make-Up-Your-Own-Question

- ❖ 33 out of 80 students chose this question (2014).
- ❖ Opportunity to show knowledge even when struggling.
- ❖ *Own-Questions* by better students have led to summer research jobs and industrial internship references.

Instructor analysis of midterm examination metrics

- ❖ Midterm is first major exam during the semester, delayed to compensate for steep initial learning curve.
- ❖ Indication of whether student expectations are realistic.
- ❖ An individual's response to midterm performance may govern their future grade estimations.

Instructor analysis of final examination metrics

- ❖ Estimation is done in-exam on items from basic knowledge to open-ended design questions.
- ❖ Distinguish between strong, average and weak students.
- ❖ Actual performance relative to estimations can provide a cross-check on question difficulty and suitability.

Quantitative course results

- ❖ Tendency to overestimate midterm performance.
- ❖ More accurate estimates for final exam.

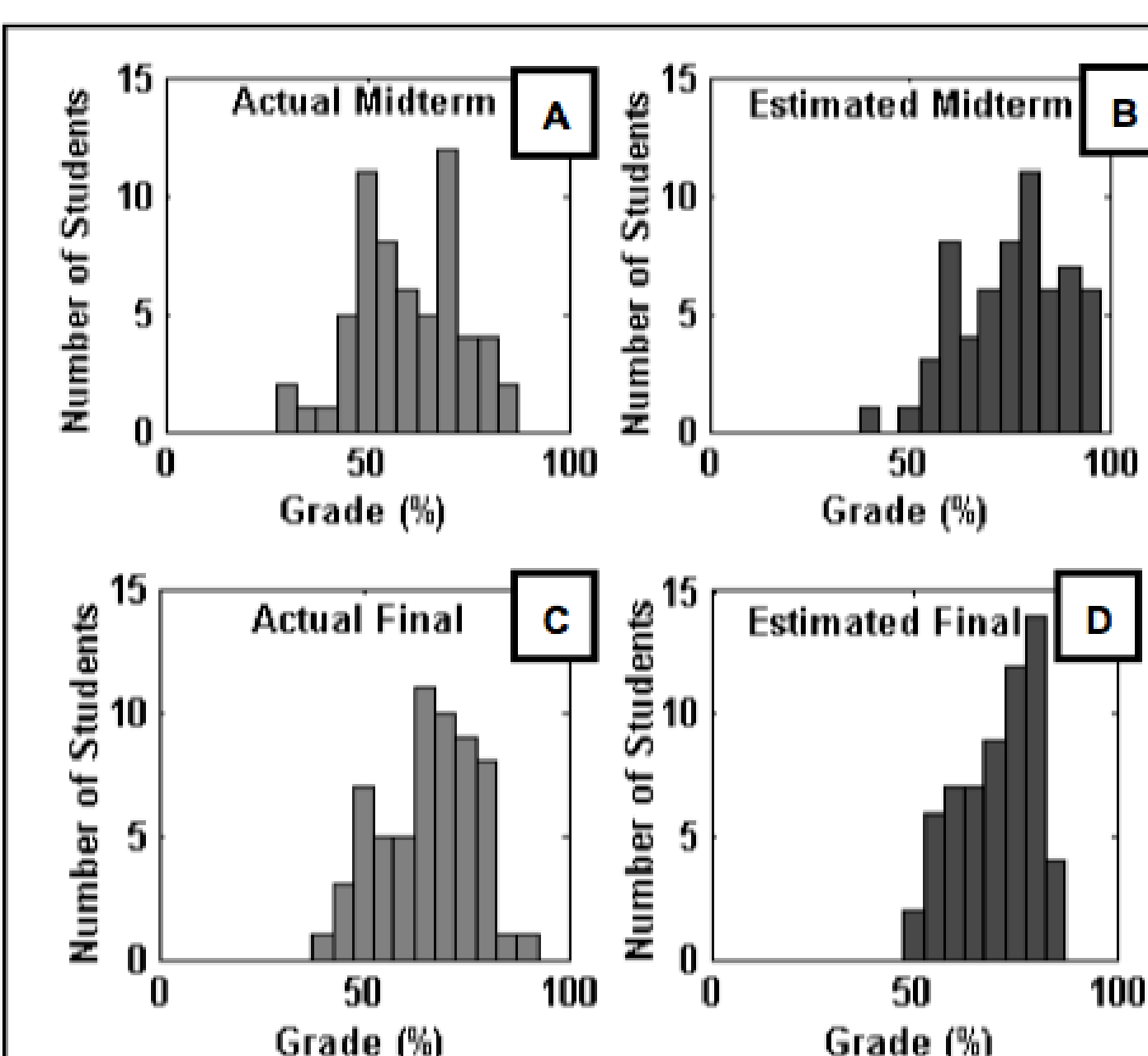


Figure 1. (A) Actual Year 2 midterm exam marks are bi-modal with peaks around 50% and 75% and are significantly lower than (B) the midterm marks estimated by students. In contrast, the actual (C) and estimated (D) final exam marks are more similar.

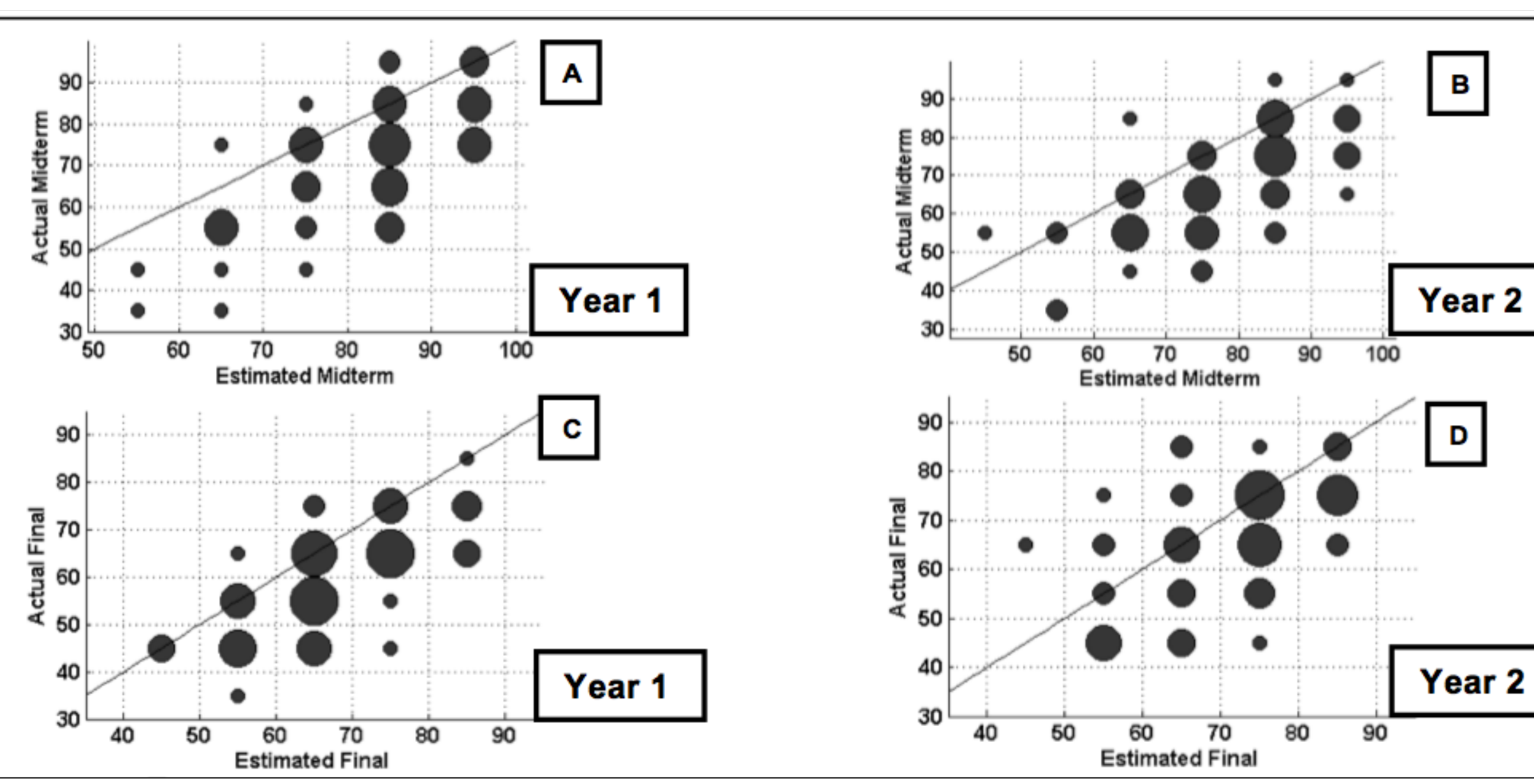


Figure 2. Relationships between estimated and actual grades. The diagonal lines indicate the split overestimation and underestimation.

- ❖ Estimate accuracy varies depending on the question.
- ❖ Straight-forward questions had high grade estimates, but poor actual performance.

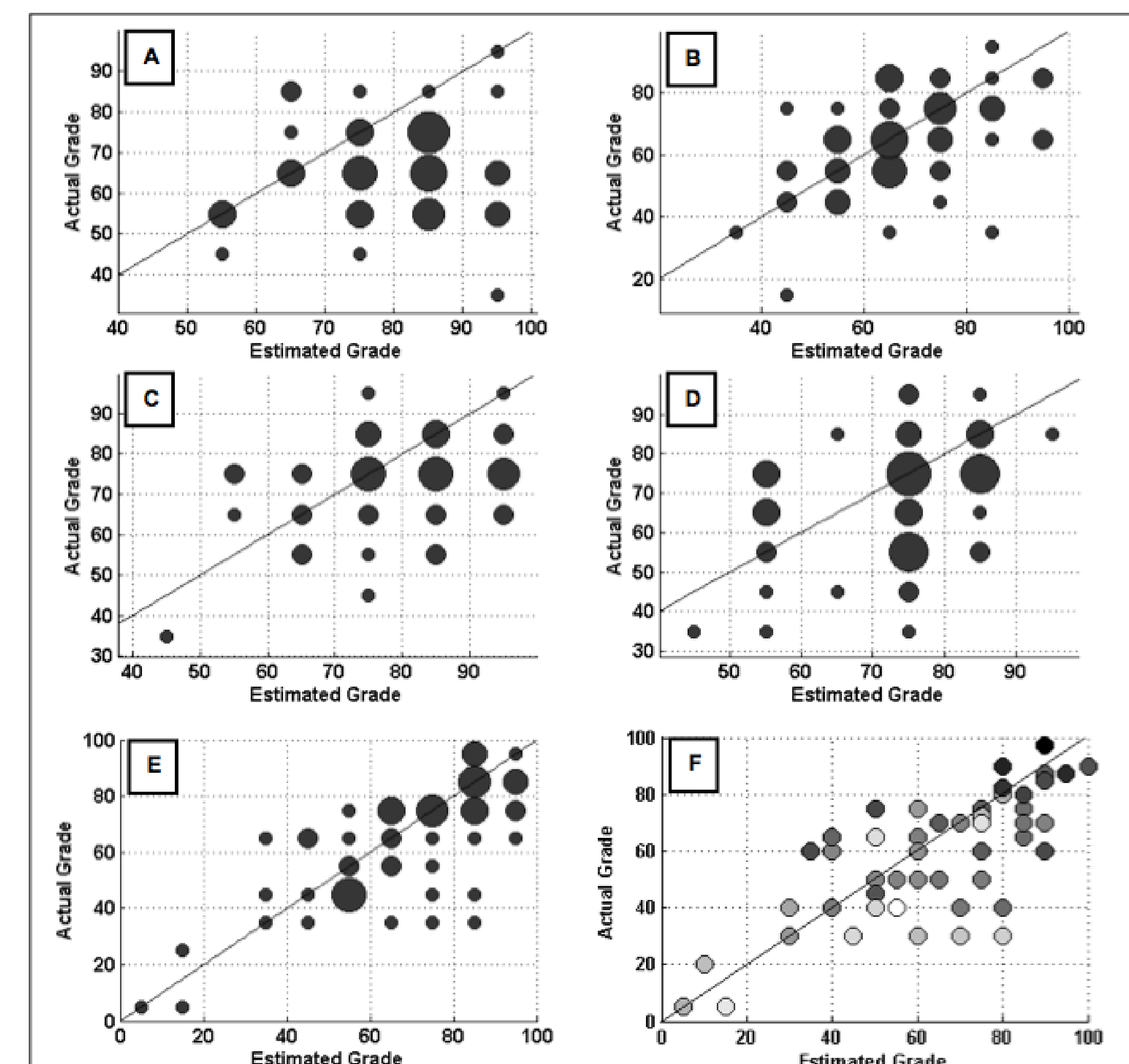


Figure 3: Individual final exam questions predictions and actual grades (Year 2). Diagonal lines represent the split between overestimation and underestimation. (A) Question 1 – Basic Knowledge, (B) Question 2 – Lab Experience, (C) Question 3 – Testing, (D) Question 4 – Extended Concepts, (E) Question 5 – Mandatory Design Question, with (F) shading information to allow comparison to high (dark) or low (light) final course grades.

- ❖ Midterm estimates were higher than final estimates.
- ❖ Final estimates were worse than actual midterm performance, possibly due to the perceptions of final exam difficulty.

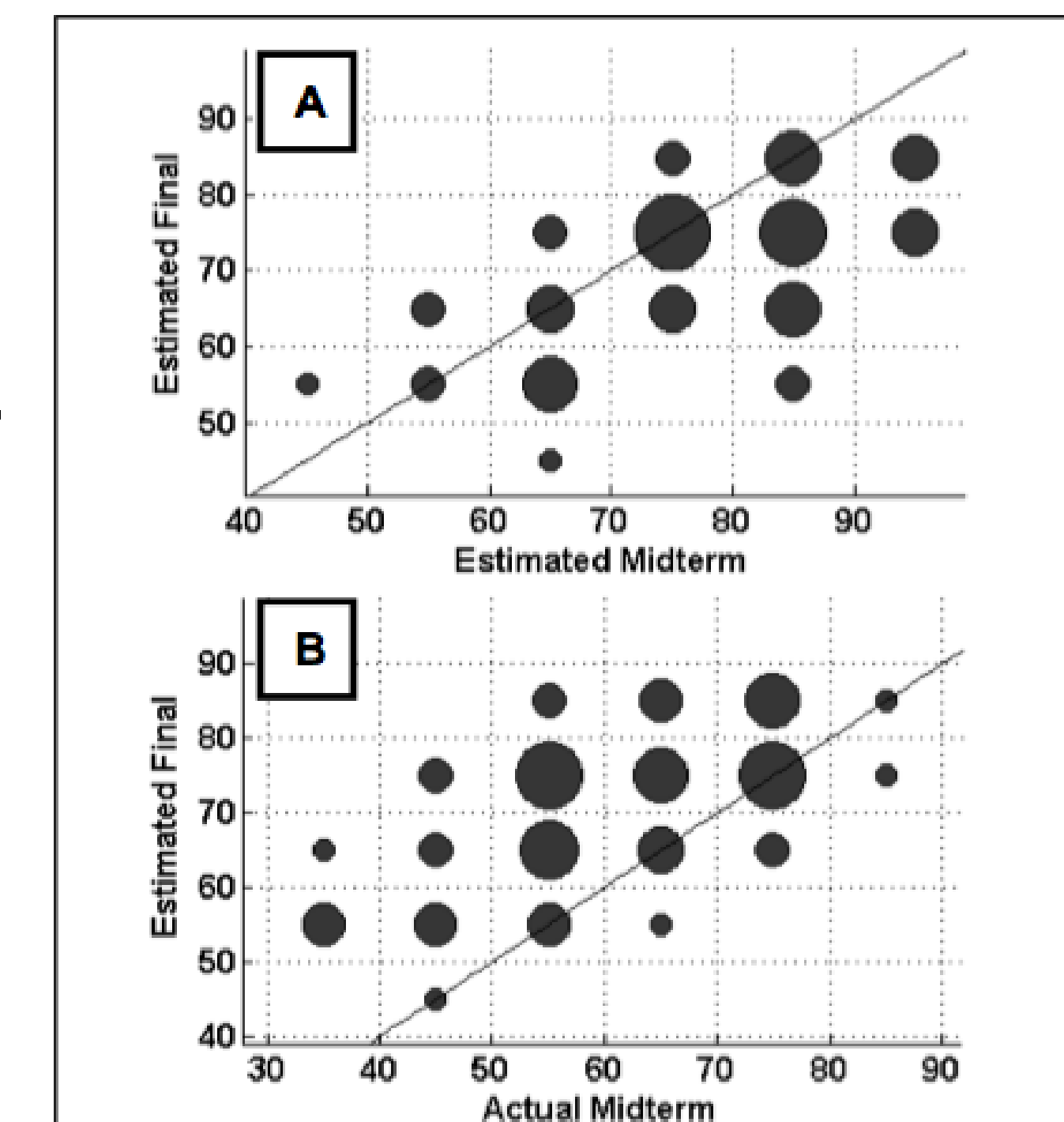


Figure 4: Progression from midterm to final. (A) Relationship between estimated midterm and estimated final. (B) Relationship between actual midterm and estimated final exam mark.

Conclusion

Self-estimation tools can provide both students and instructors with valuable insights into student effort and performance. This information may be used to improve student work ethic and confidence, while also providing feedback to instructors regarding question difficulty and understanding on quizzes, assignments, and exams.

References

- [1] Smith, Marasco, Gorobets. (2015). Earned mark analysis – Student self-evaluation tool to compare expected, planned, desired and actual student performance during project-oriented experiential courses. T & L Conference, University of Calgary.
- [2] Gorobets, Smith, Marasco. (2014). Assessing class performance and progress using grade self-estimation in undergraduate embedded systems course. CEEA 2014 Proceedings, Canmore, AB, Canada

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